GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED — OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. — Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXXI., No. 3375.] WEDNESDAY, JANUARY 25, 1928. [80TH YEAR.

Editorial Notes.

Break-up of the Eaton Gang.

THERE will be pleasure in the gas industry that at length the law has succeeded in breaking-up that notorious group of public plunderers whose operations were carried on from No. 43, Cannon Street and other subsidiary addresses. It is something like twenty-five years ago that we were first brought into contact with Eaton, who organized and was the prime mover of the machinery and the chief of the coterie who did his bidding in connection with his promotions and the hawking of worthless shares. Our contact with him those many years ago was made through a little inquisitiveness regarding a gas company whose works were Lilliputian, whose capital suggested marvellous potentialities, and whose title pegged-out an area of operations of a magnificent order—all of which raised unpleasant doubts. Since then the "JOURNAL" has kept in close touch with the activities of this man and his puppets; but never has the severest criticism brought what would have been welcomed—an attempt on their part to vindicate their honour and integrity as company promoters.

The end has come. The Chalk Fuel, Power Gas, and Bye-Products Corporation, Ltd., gave the law its opportunity. To-day, as our "Legal Intelligence" shows, Edmund Octavius Eaton is paying the penalty for his misdeeds. He has been sentenced to four years' penal servitude. Sir Charles Buckworth Herne-Soame, Bart., who for twenty years has been dragging his ancient title through the mire provided by Eaton—more for the benefit of the latter than his own—and has twice been declared bankrupt, has been sentenced to six months in the second division, which is the same punishment awarded to another confederate, Robert George Harley. A fourth Director, named Warden, who had fallen into a destitute state, ended his chequered career by committing suicide when the proceedings were commenced. But where are the others whose names were prominent in connection with many of the promotions which have been equally fraudulent? Several of the companies have already been through the receiver's hands, some have recently been and are now before the High Courts, and others will no doubt follow the same avenue to an inglorious end. Among the "Directors" of those concerns are the names of professional men who ought to be called upon to justify their association with, and membership of, the gang. It was impossible that any intelligent man could have had business relations with Eaton without quickly discovering that public robbery was his objective. It is noteworthy that immediately these public parasites got wind of the fact that the law was in motion against them, the flood of prospectuses—new or re-issued old ones—ceased.

It was a remarkable tale of cunning, deception, and unscrupulousness that Detective-Inspector Greer unfolded on Friday after the verdict of the jury, and before the Common Serjeant (Mr. H. F. Dickens, K.C.) passed sentence. He illustrated the system pursued by Eaton in his exploits, which showed him to be a man without conscience and callous to the ultimate degree in promoting his venal ends. "Send to women only" was one of his instructions; his gains were obtained from people with the scantiest of business knowledge; and some of his successes meant the impoverishment of his dupes and victims. "Many pitiful letters," said Detective-Inspector Greer, "from persons all over the country, in respect of money "they had invested in one or other of Eaton's companies, "had been received by the bankruptcy authorities and the "police. Some were from old people who relied on money "coming from investments for their subsistence, and "others from people who had invested their life's savings." We are glad that at length the disreputable organization has been broken up, and that some of those who have been identified with it have received their deserts. That it was possible to render some assistance in achieving so desirable an end, accentuates our satisfaction over the result.

The Logical Fuel and the Psychological Appeal.

IN commenting in our issue of Jan. 11 on the Presidential Address of Mr. Andrew Wilson, M.Inst.C.E., to the Australian Gas Institute, it was mentioned that a Sub-Committee reported, at the annual meeting in November, upon the question of the best means of combatting electrical competition. The report is published to-day. The Committee approach their consideration of the reference to them from the standpoint that gas is a logical fuel, but that electricity makes a tremendous psychological appeal. Some people appear to be tired of the word "psychological." It thrusts itself upon attention in the literature of the times to an extent which is regarded as unpleasant by a certain type of individual, whose nerves must be highly strung. Yet it denotes much; and it cannot be banished from consideration even in such an everyday topic as trading. The observations of our Australian friends upon the psychological appeal that electricity makes are apposite; and their discussion of what should be done by gas to counteract it is practical, and much to the point.

Nobody but an obscurant would challenge the proposition that new conditions demand new methods; but the trouble is that, though there is not the challenge, there is often a remarkable lag in the application of the one to the other. It appears to take some people a long time to evolve in their minds the simple fact that in business, as in other things, modern developments and ancient ways usually are incompatible; and that the continued application of the latter will not gain the maximum advantage from the former. The new conditions which apply to the gas industry are the diversity of the applications of gas, and the growth of competition for all the purposes for which gas is utilized. The strength of gas lies in its inherent practical merits; notwithstanding, it is found that in Australia it has its deficiencies in the matter of public appeal. The whole report of the Sub-Committee is a frank confession that these deficiencies

are largely chargeable to—shall we call it?—the past apathy of the gas industry itself, and that they are by intelligent action capable of being minimized, if not entirely exterminated. The importance of the psychological appeal is more appreciated by the Australian electrical undertakings than it has been by the gas undertakings. But there is now an awakening. At any rate, there will be if the success that has been achieved by electricity through the art of making impression serves as a salutary lesson. The electrical propagandists, as the report says, like to present their goods and methods in a way which creates an atmosphere of wonderment. We believe heartily in methods being adopted in trading which will attract attention; but we are not altogether persuaded that enveloping utilitarian appliances with an air of mystery is good. We should imagine this would act rather as a deterrent than as a recommendation. And we do not think such finesse as was practised at a recent Electrical Exposition in Melbourne can have any durable effect, as the public are not pleased when they find they are the victims of any form of duplicity. At that Exposition, though not more than 15 p.ct. of the exhibits were in direct competition with gas, the show generally induced people to think electrically. But in the "Electric Restaurant," the heavy cooking was done by gas (although electricity was available free of charge) in a secluded kitchen removed from the unsuspecting eyes of the public; but it was served to the patrons as electrically cooked food from an electric hotplate, so that the impression the Exposition was designed to create was not disturbed. That, of course, is nothing short of misrepresentation; and that is not playing the game. There is satisfaction that gas has not to stoop to such tactics.

The Committee address themselves to the main question of how the public can be persuaded, by both logical and psychological means, to accept the truth that heat and gas are synonymous. They see the logical appeal containing such components as comparative costs of electricity, appliances, and upkeep, convenience and economy, fuel conservation, and relations to hygiene. They urge the industry to proceed co-operatively; and their recommendations are comprehensive and sound. Such work, for Australia, is fresh ground; but they have before them the advantage of the combined experiences of this country and America. Moreover, the competitive conditions have developed to an established state, and will become larger. Thus from the side of gas, they require thorough treatment, and on incontrovertible bases. The Committee rightly aspire to a central laboratory where comparative and impartial tests could be carried out, and all the data from which costs are calculated be carefully noted. The same laboratory could be utilized for stamping appliances for thermal and operating efficiencies, as is done in the United States. It is highly necessary to have facts which are readily demonstrable to lay before the public. Overstatement is a besetting sin of electric appliance manufacturers—not only in Australia; and retailers are far too prone to pass the makers' figures on to the public, without any attempt at verification. It would be very easy to challenge those figures with the certified ascertainments of a testing laboratory. Again, if the public could be educated up to taking an interest in the details of gas use, it would be a great step towards the elimination of waste and misuse. As to fuel conservation, we do not think the public are enthusiastically concerned in it. They are, however, in value received for money expended; and they can do so much themselves, if only their interest can be aroused, in realizing more value for outlay. So much for the logical appeal.

The psychological appeal is made by means of propaganda, service to the consumer, creation of confidence in appliances, and by the exploitation of modern methods which cater for the convenience of the public. Persistent advocacy, as the Committee points out, is one of the methods of the electrical competitor, who in Australia believes that the greater the selection of effective modes of propaganda, and directions in which systematically to prosecute work, the better. The effort should always be to go one better than the competitor. Advertising should be consistently good throughout the country; patchy publicity is not so productive. Hence the longing in Australia for the equivalent of our "B.C.G.A." Then it is realized that all the effects at making and distributing good news will be nullified if appliances are inefficient. Efficient appliances engender confidence; inefficient ones open the door and invite the competitor to enter. Hence maintenance is strongly advised by the Committee. The best of showrooms and demonstrations, and trained and efficient salesmen, have their place in a completely organized system for developing the gas business and minimizing the transfer of existing custom. All these are ways to making appeal to the public.

From the psychological point of view, the great thing is to create a big impression, and if this can be accomplished by means which have utilitarian effects (as is possible in the case of gas), then that is far better than the transient and garish modes of electricity in all heating operations. The report shows the Australian gas industry what a great opportunity it has at hand by adopting completely the plans which have proved effective in creating a reputation for gas which will both protect and develop business. We have merit on our side. The fullest use must be made of it; but that cannot be done by partial treatment. Policy must be bold, and as perfect as it can be made.

The Coal-Selling Schemes.

As the coal-selling schemes develop, the assurances are accentuated that it is necessary the coalowners should take collective action, that if some refuse to participate they will imperil the schemes. Withal, manufacturers and industries are bade to be of good cheer, for price regulation and (as in the Three Counties Scheme) control of output will result in better working and reduced production costs. Whereupon we marvel at the need for the proposed imposition of heavy fines for those owner adherents who may violate the minimum price. We are all well aware of the difficulties with which the coal industry is faced; but manufacturers and industries cannot contemplate the proposals without feeling that their fuel costs are not going to be lessened. In fact, when the schemes were first mooted, no secret was made of the view from the side of the owners that public utility undertakings—gas was specifically mentioned—and large manufacturers would be called upon to pay more, and that a levy of a few pence per ton would have to be made to enable greater mobility of operations abroad in the interests of the export business, to provide a fund for compensation purposes for hard-hit owners, and to carry on the functions of the controlling organization. The big home consumer is a little uncomfortable regarding the situation which is being provided for him in this scheme which is going to improve the economic status of the coal industry, and at the same time (so the dispensers of consolation assert) is going so to better affairs that there will be financial advantage even to other industries. We suppose there ought to be joy over such a prospect; but somehow or other the prospect is not so clear as we should like it to be.

Regarding the position of the schemes, the Committee of the South Wales Coal Marketing Association have drawn up a comprehensive list of qualities and values; but secrecy is at present being maintained concerning the determinations. The owners evidently want to get everything satisfactorily settled on their side before giving the public too much information. But, though privacy has been desired, information has leaked out on the Cardiff Coal and Shipping Exchange to the effect that no minimum prices have yet been definitely fixed for any of the groups, but figures have been given to indicate the suggested ratio between the various grades of coal. These show increases of from 9d. to 1s. per ton on prevailing prices. As to the Three Counties Scheme, it is being formally constituted; and the work of electing the three main Committees is proceeding, and they will shortly be functioning. If Lancashire and adjoining counties—Cheshire, North Staffordshire, Cannock Chase, Leicestershire, and Warwickshire—unite themselves with the Yorkshire, Derbyshire, and Nottinghamshire owners, they would account for not far short of 50 p.ct. (112 million tons) of the present total output of the country. But there is no certainty yet that the scheme will work to the satisfaction

of the owners. In an article contributed to the "Yorkshire Post" by Mr. A. W. Archer, who is well known in the coal world, there is acknowledgment that the scheme is not free from difficulties, and that its administration will not be universally approved. Success will largely depend upon wise administration and good faith. Mr. Archer finds it too much to hope that troubles will not occur during the early stages; but that they can be overcome by tact, goodwill, and capacity, he does not doubt. In respect of adherence, how small the margin is between success and failure is shown by this passage in the article: "If all the collieries in the three counties "voluntarily come in, the success of the scheme would "be assured from the start; but if 10 or 20 p.ct. stand "out, difficulty and dissension may arise, and the effect "may be deplorable." It is easy to see, if the owners of (say) one-fifth of the quantity of coal produced in the three counties stand out for free trading, it would make things very unpleasant for their neighbour's business working under organized control.

The coal-selling schemes are partly directed to the improvement of the coal export trade; but it is not likely that, if there is to be something in the nature of keener competition abroad, the British owners will have a walk-over. The Polish Miners' Association have decided to meet the competition from England by reducing their own prices for coal exported to Scandinavia. The miners in the Pas de Calais and the Nord are urging their Government to reconsider the position of the coal industry in France; and to do something to ameliorate the conditions in respect of foreign competition—particularly from Britain—in view of the unemployment among French miners. The German coalowners—the Selling Syndicate especially—are watching very narrowly the developments in this country. The contest will not be a light one. It will be a question of price. Who is going to pay in this country?

Comparisons at this Year's Company Meetings.

NOTICES are now being given of the annual meetings of gas companies; and Chairmen will be preparing their notes for the addresses which will show the results of the operations of the concerns over which they preside, and the progress which those results indicate. There will be a little difficulty in this respect owing first to the fact that the year 1926 was, in view of the general and coal strikes, of an abnormal character. Secondly, 1927 was not in the early part completely normal in regard to gas prices and the clearing away of the balances of high costs for coal contracted for during the great upheaval. Throughout, too, the weather was peculiarly insensible to proper behaviour—perhaps not altogether to the disadvantage of the industry. Of course, comparison with 1926 will not be wholly devoid of interest because of the lessons afforded in regard to costs between labour unrest and rest, but a more reliable comparative picture regarding progress will be obtained by making contrast with 1925. Just by way of illustration, take some comparative figures quoted at the annual meeting of the Aldershot Gas, Water, and District Lighting Company by the Chairman and Managing Director (Mr. R. W. Edwards), as reported in this issue. They refer to the revenue from secondary products. The amount so received in 1927, he says, represented 56·6 p.ct. of the cost of coal, as compared with 66·8 p.ct. in the strike year, and 46·1 p.ct. in 1925. Of course, in 1926 coke was much in favour and valuable, and coal was dear; and therefore all that can be said in this respect of 1926 is that the undertaking was fortunate in obtaining through secondary products 66·8 p.ct. of the heavy cost of the coal. But that percentage figure has no value for comparative purposes with 1927. There is, however, ground for satisfaction when it is seen that, though the 1927 percentage figure is about 10 points below 1926, it is 10·5 points higher than that for 1925. Therefore, we anticipate that during the next few weeks we shall be having comparisons not only with the exceptional year 1926, but with the more normal one of 1925. By the way, the Aldershot Company appear to be setting-up records for the prompt holding of annual meetings and the paying of dividends after the close of the year, albeit they have to deal with the working and accounts of three undertakings—gas, water, and electricity—all of which show business advance. The sharp presentation of accounts is due to good organization and excellent team work—in the Chief Accountant's and the Secretary's departments, supported by the contributions required in respect of the manufacturing operations from the Engineer's department.

Manchester Explosion Inquiry.

The cause of the explosion at the Manchester (Bradford Road) Gas-Works on Aug. 23, which wrecked two holders, has been the subject of much speculation in gas-engineering circles, but nothing definite has publicly emerged to account for the occurrence. It is hoped that the official investigation which is to be made by Mr. Frederick Owen Stanford, M.Inst.C.E., one of the Inspectors of the Ministry of Health (who has been appointed for the purpose by the Home Office), will be successful in fathoming the cause. The inquiry is to be opened on Feb. 2. The official notice regarding the inquiry (as published in a later column) intimates that Mr. Stanford will be pleased to receive communications from anyone desirous of giving evidence, with an indication of the nature of the testimony it is proposed to tender.

Gas at the Fair.

The gas requirements of the various portions of the British Industries Fair at Birmingham are this year greater than ever. The Corporation of Birmingham Gas Department has a large number of fitters employed on this work, and good progress is being made. The existence of the special Gas Industries Section has, of course, added considerably to the number of stands needing gas supplies; but, throughout all sections are to be found firms who for various working demonstrations require the ubiquitous "gas service." Good progress is being made with the erection of stands in the Gas Section, and every effort put forth to ensure completion in good time for the opening. Invitations are being sent out to all the chief gas engineers and buyers in the kingdom, and Mr. R. J. Rogers, Hon. Secretary of the Gas Industries Section (Gas Department, Council House, Birmingham), will arrange for a ticket of admission, with reduced rail fare voucher, to be sent to anyone who applies to him.

Blending Coal for Coking.

The members of the Midland Section of the Coke-Oven Managers' Association have been discussing the subject of the blending of coal. The difficulties of mixing coals, even in the case of two classes, so as to get equality in the mass is recognized; but, as Mr. C. P. Finn pointed out, it is much more difficult to mix (say) fifteen varieties. It was mentioned that a big coal combine are looking for the ideal plant for mixing no less than fourteen different varieties of coal. We hope they will find it. It is essential, using several coals, if a uniform quality of coke is required for a particular purpose, that there should be blending. As Dr. Foxwell points out, some coke-ovens are now making household coke; and this necessitates a different blend from what is required for the metallurgical product. It was indicated by one speaker that the cost of blending runs out to about 1s. per ton; but we remember that Sir Arthur Duckham calculated that the figure for gas-works purposes would be only a few pence per ton. Of course, there must be knowledge of the chemical and physical characteristics of the coals in order to obtain satisfactory blends; and the provision of such basic information is the work of the laboratory.

Natural Gas and Oil Production.

Apparently with a view to stopping the over-production of oil in the United States (which has been a matter of much concern for some time), the American Petroleum Institute has passed a resolution which submits that the prevention of waste of natural gas found in oil-producing formations is of paramount importance in connection with the economic production and conservation of oil; and they indicate that waste of gas cannot be prevented so long as there is a disregard of the corelative rights of producers, or a desire to obtain more oil than underlies the individual producer's property. Such disregard

and desire result in the continued waste of gas. The Board of Directors of the Institute therefore favour the enactment of laws to prevent the waste of gas by oil-producing States. "The Petroleum Times" looks upon this as committing the Institute to a policy of State legislation to effect conservation of natural gas as a means of regulating crude oil production. In its opinion, this is altogether wrong, as it can only mean that the State will become a party to the inner conduct of the business of oil production. Our contemporary describes legislation for this purpose as being an appreciable step towards the socialization or nationalizing of the industry. It deprecates the world-wide tendency to appeal to Governments in any kind of crisis rather than try to find a way out by self-reliance.

Coal Output in December.

From the weekly returns of coal output in Great Britain, it is seen that during the week ending Dec. 3 the production was 5,027,700 tons; the aggregate number of workers being 976,100. In the week ended Dec. 10, the production was 5,173,500 tons; the workers numbering 975,400. In the week ended Dec. 17, the output was 5,353,300 tons, with 975,700 workers. The yield in the week ended Dec. 24 was 5,063,000 tons, with 972,200 workers. Naturally, owing to the Christmas holidays, there was a big drop in production in the week ended Dec. 31. It was 3,240,000 tons, with a workers' roll of 969,500.

Trade and National Economy.

Mr. Gilbert C. Vyle, in his Presidential Address to the Association of British Chambers of Commerce last Thursday, made out a strong case for the wise curtailment of national expenditure, as well as for postponing all legislation which would add to the rates, which are already severely handicapping industry and commerce. He cannot accept the announcement made from time to time that an annual expenditure of upwards of 800 millions sterling is a figure to which industry must adjust itself, and that there is no room for a reduction. A resolution was carried calling for local economy; and there was strong advocacy of the commercial classes taking a larger share in municipal life.

Employment v. Unemployment.

Prominent men in the financial and industrial worlds are forecasting a substantial revival of trade in 1928. We hope the predictions will be honoured by materialization. In this connection an interesting point has been made in two quarters. We are accustomed to draw comparisons of the position of work in this country in terms of unemployment—rarely in terms of employment. Reviewing the labour conditions in 1927, the "Ministry of Labour Gazette" says that, despite acute depression in some important industries, the average number of persons actually employed was higher last year than in any previous one. That is a striking statement. It shows that, largely due to the establishing of new industries, the demand for labour is greater than it ever was; but the increase of demand has not kept pace with the increase of supply. Lord Gainford, at a luncheon of the American Chamber of Commerce the other day, pointed out that, although there is great depression in cotton, coal, and agriculture, in the last four years home industry has been developed; and in thirty-four new industries which have been established, an additional 874,000 people have been employed. We shall think of these facts when the figures as to unemployed on the registers of the Employment Exchanges—such as 1 million or more—come before us week by week, as they have been doing with monotonous regularity for some time past. Perhaps the anticipated revival of trade will do something to bring more satisfaction, with a decrease in the dole expenditure.

Second International Conference on Bituminous Coal.—The President of the Carnegie Institute of Technology, Mr. Thomas S. Baker, will visit some of the principal cities of Europe during the months of March and April, to confer with fuel technologists who may consider the possibility of presenting papers or taking part in the Congress, which, as previously announced in the "JOURNAL," is to be held at Pittsburg from Nov. 19 to 24. President Baker's address after Feb. 25 will be: Care of the Guaranty Trust Company, 1, Rue des Italiens, Paris, where he will be glad to receive correspondence in regard to the meeting.

PERSONAL.

The January issue of the "Co-Partners' Magazine" of the Gas Light and Coke Company contains the gratifying announcement that Mr. W. B. LEECH, who has passed through a very severe illness, is making good progress, and hopes to be able to take up work again in the early spring. It is a matter of great regret that his condition will not allow him to resume his position as Engineer at Beckton; but the Directors have appointed him to take up special work under the Chief Engineer at Westminster. Mr. R. W. HUNTER has been appointed by the Directors to succeed Mr. Leech as Resident Engineer of the Beckton Station. Mr. Hunter, who began his career with the Company as Engineer Pupil at Beckton in 1902, has spent the whole of his time in the Company at that station, except for three and a half years, when he served at Bromley as Deputy-Engineer. For the past two years he has been Senior Assistant at Beckton. Mr. Hunter served with "The Rangers" in France. Mr. STEPHEN HAY has been appointed Assistant Resident Engineer at Beckton.

The Skipton Urban District Council, on Jan. 17, decided to retain in an advisory capacity the services of Mr. J. H. WOODWARD, the Gas Engineer and Manager, who is entitled to retire on April 1 after 27 years in that position.

Mr. WALTER DUNN, M.I.Mech.E., Secretary of the Institution of Gas Engineers since 1896, was, at the recent annual general meeting of the Chartered Institute of Secretaries, re-elected a member of Council for a further term of three years.

Mr. S. E. LOGSDON, Engineer of the Pernambuco, Brazil, Gas Undertaking, returned to Pernambuco on the 20th inst., to resume his duties, after having spent four months' leave in this country and Norway.

The marriage has taken place at St. Joseph's Catholic Church, Penarth, of Mr. T. A. CANNING, eldest son of Mr. J. H. Canning, Manager and Engineer of the Newport Gas Company, and Miss K. M. White, of Penarth. Mr. T. A. Canning was formerly in the service of the Newport Gas Company, but is now Assistant Engineer and Manager to the Woking Gas Company. The bridegroom was presented by the staff of the Newport Gas Company with a beautiful chiming clock to mark the happy occasion, and as an expression of the esteem in which he is held by his old colleagues.

His many friends in the industry will be pleased to know that Mr. G. W. MARTIN, the Manager of the Houghton-le-Spring District Gas Company, will be installed as W.M. of the Sancroft Lodge, No. 4347, at the festival of the Lodge to-morrow. We tender him our hearty good wishes for a successful year of office.

Councillor and Mrs. R. WOODS, of Kirkham, celebrated their golden wedding on Jan. 17. Mr. Woods is Chairman of Directors of the Kirkham Gas Company.

OBITUARY.

On Jan. 12, Mr. HENRY GRAHAM ATLEY, the 14-year-old son of Mr. W. W. Atley, the Engineer and Manager of the Stockton Gas-Works, died of pneumonia in a Middlesbrough nursing home. Sympathy is extended to Mr. and Mrs. Atley.

Sand-Blasting Corroded Pipes.

There is a great variety of soils in and around Los Angeles; and some of them are highly corrosive in nature. This has led the local Gas and Electric Corporation to adopt the system of coating the pipes with pitch, and then wrapping them in a heavy felt paper. In connection with street improvements the Corporation make a practice of re-conditioning the mains and services; and when there have been any signs of pitting, it has been the custom to remove the affected pipe and instal in its place a wrapped and coated one. This, however, proved expensive; and therefore experiments were undertaken in cleaning and wrapping the mains *in situ*, provided corrosion had not penetrated too deeply. Ways of field wrapping were developed successfully; but writing in the "American Gas Association Monthly," Mr. R. C. Boughton (the Corporation's Gas Distribution Engineer) says there was trouble with the wire brush method of cleaning. This led to a trial being given to sand-blasting, which proved highly satisfactory. The surface left after sand-blasting is not only clean, but it is also roughened, which causes subsequent applications of primers and asphalts to adhere tightly. More than this, the pits are thoroughly cleaned-out, and can be carefully inspected. Pits which have penetrated to a degree thought dangerous are built-up by oxy-acetylene welding. On one particular job, embracing about 6000 ft. of 8-in. pipe laid in 1917, all was saved except a little more than 500 ft.; and on this 500 ft., a sand-blast pierced through the pits in the wall of the pipe, the corrosion having been very severe. The cost of cleaning by the sand-blast method is much lower than that of any other plan tried to date.

ELECTRICITY SUPPLY MEMORANDA.

FROM time to time the question arises among electrical engineers as to whether or not the vagarious load supplied by domestic heating is really of advantage to their undertakings.

Heating and the Bulk Tariff.

The subject arises again in connection with the arctic state of the weather about Christmas time. A letter by Mr. A. W. Blake, Electrical Engineer of Willesden, published by the "Electrical Review," calls attention to the fairly heavy heating loads experienced at that time, when lighting loads were at their maximum. Many engineers, as a result, will have fairly accurate data or estimates of the effect this load can have upon their load factor for the year; and Mr. Blake suggests that it would be of value to the industry if the information was sent to our contemporary for publication. Having given a basis on which the cost per unit for the heating load should be worked out, he says that the particulars will serve as a valuable guide to the importance of bulk-supply tariffs as compared with local generation, and indicate to some extent the desirability *or otherwise* of an undertaking encouraging domestic heating. In a comment on the subject, the "Review" points out that such questions as this have greatly increased in importance, in view of the coming régime, when eventually all electricity will be supplied in bulk to authorized distributors. Some station engineers appear to be very perturbed as to what will happen when the bulk-supply tariff is fixed by the Central Electricity Board. With current supplied at a uniform tariff to an undertaking, with no consideration of the purposes for which it will be used, the same argument and liberty as apply under the conditions of local generation will be largely annulled; and there can be little question that, in the time to come, there will have to be a considerable revision of local tariffs to meet the new circumstances. It is, however, all very vague at present; but electrical engineers, we are afraid, will have to possess their souls in patience until the Central Electricity Board are in a position to issue information on this disquieting subject which will enable each district to make its own determinations regarding a scale of appropriate charges.

Bulk-Supply Tariff Framing.

The course of procedure for the Electricity Board in framing tariffs for bulk-supply to authorized undertakings is defined by section 11 of the Electricity (Supply) Act, 1926, the rules for determining the cost of production at selected stations are embodied in the second schedule, and rules for determining the fixed kilowatt charges component and the running charges component are set out in the seventh schedule. By clause 11 the price to be charged by the Board for electricity supplied directly by them to authorized undertakings is to be in accordance with a tariff fixed from time to time; and it is to be so ordered that, over a term of years to be approved by the Electricity Commissioners, the receipts on income account will be sufficient to cover the expenditure on the same account, including interest and sinking-fund charges, with such a margin as the Commissioners may allow. The tariff is to be framed to include as part of the charge and shown separately: (1) A fixed kilowatt charge component; and (2) a running charge component. These components are to be ascertained in accordance with such principles as may be approved by the Electricity Commissioners, or the tariff may be framed in such other manner as may be determined by an Order of that body, which, however, is not to come into force until it has been laid before each House of Parliament for a period of not less than thirty days, and if either House of Parliament, before the expiration of that period, presents an address to His Majesty, no further proceedings are to be taken thereon. The tariff so fixed may, if the Board think fit, vary for different areas. We rather fancy they will see fit to vary them. However, from this it will be seen that electricity purveyors in respect of the bulk-supply tariffs they will have to pay are at present very much in the clouds. We imagine that few of them will be willing when bulk supply comes to retail current for (say) water heating on the storage system at about fuel cost.

Home Uneconomy.

An article on "The Home and Women's Interests" appeared in the "Daily Telegraph" on Jan. 14. It stated that an electrical system at a reasonable cost for supplying hot water "to the various parts" of the house may be obtained by installing an electric geyser. Then it proceeds to say that in districts where the electricity undertakings supply power at 1d. per unit, the cost of providing hot water "to the scullery" of an ordinary house by means of an electric geyser is calculated at 1s. 3½d. per week. Larger buildings or public institutions can, if desired, be supplied with this instrument of greater capacity. The statements are interesting. In a scullery, boiling and not tepid water is required. An expenditure of 1s. 3½d. on electricity at 1d. per unit would purchase 52,886 B.Th.U. (15·5 KW.-H.). Assuming an inlet temperature of 48° (which does not obtain in winter), the quantity of boiling water which would be delivered by the use of the number of heat units named would be 32 gallons, at 100 p.ct. efficiency, and therefore no heat losses! A modern gas geyser would perform the operation for the same quantity of heat—costing, according to locality, from 3d. to 5d., except, of course, in cases where gas is above 10d. per therm. The article also speaks of supplying hot water to "various parts" of the house. Supposing the water were required for baths at a temperature (say) of 110°, the expenditure of the 52,886 B.Th.U. would provide (at 100 p.ct. efficiency) about 82 gallons—sufficient for about three decent sized baths. That would not go far with half-a-dozen people in the house, who may, if not restricted by electrical heating, delight in a daily sponge down. But the transmission of the water to the various parts of the house would mean loss of heat in transmission; so that the temperature or the quantity of water would not be up to the figures named. The interests of the home and the women in it would be better served by a cheaper and more convenient heating agent. The expenditure of 1s. 3½d. per week (if adequate) would mean £3 7s. 2d. a year; 5d. a week, £1 1s. 8d.; and 6d., £1 6s. To be fair to the writer of the article, it should be mentioned that reference is made to a water-heater which, for a pennyworth of gas, provides "a good bath of hot water in twenty-one minutes." The statement is deficient in that it does not tell us the price per therm of the gas, or the quantity of water that, in the opinion of the writer, constitutes a "good bath." Given this information we could ascertain the approximate temperature. Loosely presented information on such subjects as these is very misleading to the public.

Royal Institution Explosion Experiences.

"Engineering" considers that the explosion which took place in Albemarle Street, Piccadilly, on Dec. 29, requires investigation by the Electricity Commissioners, in the same way as the Acton case. We are of opinion that an inquiry would only lead to a similar conclusion; in fact, it appears to be practically admitted that the conditions so far as gas generation is concerned were the same—an electrical fusion and bitumen collaborating. Our contemporary gives further information as to the experiences at the Royal Institution; and from it we take the following particulars: Sir William Bragg, Director of the Institution, Mr. Green, physical assistant, and Mr. Mitcham, electrician, were present when, soon after 7 p.m., a smell of burning and an unsteadiness in the lamps were noticed. A search revealed nothing wrong. An explosion took place soon after, followed by others—the second one the most violent—all within twenty minutes; the electric current was cut off immediately after the first explosion. The supply is from the Westminster Electricity Company; the main cable running along the front of the Royal Institution, under the pavement. The service connection to the main switchboard is through two insulated cables encased in two 1½-in. iron pipes from a junction box outside. These service cables, as well as the switchboard, are intact; but fumes were seen to rush out of the pipes, which pass through the outer wall into the basement. Further south the street electric main lies on the top of the outer vaulting of the basement; vault and basement being connected by a wooden door. This door was blown inwards; but very little further damage was done at this point. The lid of one of the three exploding manholes outside was blown up as high as the building, and pillars of flame followed; the flames, partly from the asphalt pavement, smouldered for about an hour. Many windows were smashed in the southern portion of the building, on all the three floors; and the soot rushing in covered everything with a uniform black coating. This deposit can, however, easily be blown off, leaving white paper underneath unstained; it contains metallic particles. Small wonder the experience was described at the time as alarming.

Strike of Consumers.

Strikes and threats of strikes by electrical workers have been common occurrences; but the "Daily Telegraph" correspondent in Paris recently sent information of a strike of a peculiar kind, which had then been commenced in Boulogne. It appears that the Municipality inflicted some new local taxes, to which the ratepayers strongly objected. What the Municipality did in the desire to increase their revenue resources was to tax dustbins, gas and electric lighting, balconies, billiards, and other things. The ratepayers joined with the trade unions in a revolt against the new imposts. The storm caused the Council to suppress the taxes; but they replaced them by the imposition of additional payments, at the same time insisting on the taxes due for last year being met. This led the tradespeople to put their heads together, and decide not to use gas and electricity for a fortnight. This resulted in only feeble illumination inside the shops; and the streets

looked unusually dismal with only the illumination supplied by the street-lamps. Whether the strike lasted its allotted span, we have no information. If it did, we should imagine the shops lost trade through the poverty of illumination.

Mishaps.

The story of a tragedy occasioned by a wire clothes line which came into contact with an overhead electric cable was told at Ynysddu last Tuesday week, when there was an investigation into the cause of the death of William Henry Morris, age 25. It appears that in the yard of his house, there are two wire clothes lines. Deceased was taking a cloth off one of them when he was electrocuted; and his mother-in-law and a neighbour who ran to his rescue had, as the coroner remarked, providential escapes. It appeared that the clothes line had by some means become twisted round the electric cable which supplied the house from a main cable; and one of the strands of the clothes line apparently penetrated the insulation of the cable. The jury, in returning a verdict of "Death by Misadventure," suggested that in future cables and wire clothes lines should be kept as far apart as possible. Information comes from Bristol that the church of St. Mary, Shirehampton, was destroyed by fire on Sunday morning of last week; only the vestry being left intact. The church is over 100 years old; and it is believed that its destruction was caused by the fusing of an electric wire. In attending the assizes at Reading on the 16th inst., Mr. Justice Roche had what is described as an alarming experience when he found his sitting-room on fire. The curtains, window seat, and furniture were well alight; and the only cause that can be assigned for the trouble is that the window curtains blew against an electric fire. A Northwich correspondent states that the electric light failed in the town and district on Friday, Jan. 6; and did not function again until shortly before ten o'clock the following night. Users of the current had to procure as speedily as possible a temporary illuminant. It was market day; and the business was in full swing when, at 4.45, the current collapsed. Candles or oil lamps were speedily requisitioned. The premises of those tradespeople who had retained reliable gas for illumination stood out prominently among the dimly candle lighted shops and public-houses. One big store was absolutely cleared out of its huge stock of candles; another firm sold close upon 4000; while ironmongers disposed of oil lamps which they had had for years. The Gas Company had numerous applications for installations. On Wednesday last week Weymouth suffered a breakdown—the failure lasting about 35 minutes. Users of the current were thrown into confusion; and the usual search was made for candles and oil lamps—particularly for use in public institutions, where there is no auxiliary lighting. At the hospital, candles were brought into the wards and an operation had to be delayed. At a local hall a dance was abruptly terminated. It was explained at the electricity station that there had been a breakdown of one of the pumping auxiliaries for the condensing plant. On the 18th inst., Perth experienced a collapse, which is attributed to a "minor" mishap at the electricity works.

CALCIUM CHLORIDE FOR DRYING GAS.

The value of the paper recently read by Mr. C. Harris, of Taunton, before the Southern Association of Gas Engineers and Managers, on "The Partial Drying of Town Gas," is acknowledged, in a letter to the "Gas Age-Record," by Mr. F. W. Sperr, Junr., Director of Research at the Koppers Company Laboratory. This firm have long been interested in the dehydration of manufactured gas; and Mr. Sperr offers the following comments on the use of calcium chloride for the purpose:

A word of caution on the use of calcium chloride may not be amiss. Much work along very similar lines has been done by engineers in the development of air-conditioning equipment for use in public buildings, and in certain industries whose operations require a constant air temperature and humidity. The Carrier Engineering Corporation occupies an outstanding position in this field; and they advise that calcium chloride solutions were early tried for drying the air, and artificially refrigerated calcium chloride solutions for both cooling and drying it. In both cases there was an entrainment of calcium chloride spray in the treated air which deposited a sticky film of calcium chloride over the floor, walls, and contents of the rooms. Removal of the last traces of this entrained spray was so difficult, and its effect so deleterious, as to eliminate completely calcium chloride solutions from use in air conditioning.

The principal saving to be realized from dehydration is the reduction of corrosion in the distribution system. Several years' experience in the distribution of dehydrated gas will be necessary before this saving can be accurately determined. The corrosive effect of chloride brines is well known; and we believe that the experience of air-conditioning engineers warrants a very cautious attitude on the part of gas men towards dehydration with calcium chloride solutions. It is easily conceivable that the increased corrosion caused by minute amounts of calcium chloride spray which may be deposited in the mains would more than off-set any reduction effected by the removal of water. No doubt, Mr. Harris's organization will make observations from time to time which will eventually prove whether any danger of this sort exists.

MANCHESTER GASHOLDER EXPLOSION.

Government Investigation.

It is announced by the Ministry of Health that Mr. Frederick Owen Stanford, O.B.E., M.Inst.C.E., one of their Engineering Inspectors, having been appointed by the Secretary of State for the Home Department, in pursuance of section 22 of the Factory and Workshop Act, 1901, to hold a formal investigation of the accident which occurred at the Bradford Road Gas-Works, Manchester, on Aug. 23, 1927, and its causes and circumstances, will open an inquiry in respect of the matter at the Town Hall, Manchester, on Thursday, Feb. 2, 1928, at 10 a.m.

All persons desirous of tendering evidence at the inquiry are requested to send their names to Mr. Stanford at the Ministry of Health, Whitehall, London, S.W. 1, not later than Monday, Jan. 30, together with the names of any proposed witnesses, and an intimation of the nature of the evidence which they desire to tender.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Jan. 27.—BRITISH COMMERCIAL GAS ASSOCIATION.—Scottish District Conference in Edinburgh.

Jan. 27.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. F. M. Birks, O.B.E., on "Notes on the Mechanical Work at the Beckton Station of the Gas Light and Coke Company."

Jan. 28.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Provan Chemical Works, Glasgow.

Feb. 4.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Cardiff. Paper by Mr. C. S. Thane on "Some Mechanical Operations on a Gas-Works."

Feb. 4.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting. Address by Mr. Thomas Hardie, and paper by Dr. E. W. Smith on "Modern Tendencies in Carbonizing Practice."

Feb. 11.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the works of the Sutton Gas Company.

Feb. 11.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Windsor Street Gas-Works, Birmingham.

Feb. 11.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to the Burntisland Gas-Works and the Pettycur Bottle Works, Kinghorn.

Feb. 11.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Meeting in the Royal Technical College, Glasgow. Paper by Mr. W. Scott, of Glasgow, on the "Control of Calorific Value."

Feb. 14.—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Board.

Feb. 14.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

Feb. 16.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting. Paper by Mr. J. W. Wood, M.Sc., on "Aeration."

Feb. 20-March 2.—BRITISH INDUSTRIES FAIR.—Birmingham and London.

Feb. 21-24.—CARBONIZATION CONFERENCE.—Midland Institute, Birmingham.

Feb. 22.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Joint meeting with YORKSHIRE JUNIOR GAS ASSOCIATION. Visit to the works of the National Gas Engine Company, Ltd., Ashton-under-Lyne. Paper by Mr. W. P. Smith, B.Sc., of Bolton, on "Gas-Works Effluent."

Feb. 22.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of the General Committee in Birmingham.

Feb. 24.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. H. J. Escreet, B.Sc., of the Gas Light and Coke Company: "Notes on the Laying of Gas Mains of Large Diameter."

Feb. 25.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Works of Messrs. Walter McGee & Sons, Ltd., Paisley.

March 2.—"B.C.G.A." INDUSTRIAL SALESMEN'S CIRCLE.—Meeting in Birmingham.

INSTITUTION OF GAS ENGINEERS.

Feb. 13.—Emergency Committee, Finance Committee, Council Meeting.

Feb. 14.—Gas Education Executive Committee.

AUSTRALIAN GAS INSTITUTE.

Report of Proceedings at the Second Annual Convention held in Sydney, Nov. 15, 16, 17, and 18, 1927, under the Presidency of Mr. Andrew Wilson, M.Inst.C.E., General Manager and Secretary of the Australian Gas Light Company. For Presidential Address, see "JOURNAL" for Jan. 11, p. 87.

The Second Annual Conference of the Australian Gas Institute was held in Sydney on Nov. 15, 16, 17, and 18 last, under the presidency of Mr. Andrew Wilson, M.Inst.C.E., General Manager and Secretary of the Australian Gas Light Company, Sydney.

Visitors included Sir Henry Cowan, M.P., and Mr. James Lowe, Engineer and Manager of the Auckland Gas Company, New Zealand.

The following reports of Special Committees were read and discussed—viz.:

(1) Report of Secretaries on the "Development of a Standard System of Accounts."

(2) Report of Engineers and Secretaries—"To investigate and report upon the best means of combating electrical competition, with special consideration to propaganda and education of the public, comparisons with electric appliances, and such other methods as the Committee may think advisable."

(3) Report of Engineers—"To inquire into and report upon the causes of corrosion in mains and services, with the means of its elimination and prevention."

The following papers were read:

"The Design of Gas Condensers," by Mr. H. Tindale, Australian Gas Light Company, Sydney.

"Modern Engineering Developments as applied to Gas Plant Construction," by Mr. H. E. Grove, Metropolitan Gas Company, Melbourne.

"Small Works' Complexities," by Messrs. E. J. Lord and W. H. Shedden, Brisbane.

"Psychology of Selling," by Mr. A. H. Smedley, Manly Gas Company, Sydney.

"The Use of Town Gas for Industrial Purposes," by Mr. J. H. Banks, Australian Gas Light Company, Sydney.

Interesting discussions took place on the whole of these papers.

The reports are dealt with in this issue, while the papers are reserved for subsequent notice.

The annual luncheon was held on Tuesday, Nov. 15, at which the Governor of New South Wales, Sir Dudley de Chair, and many other distinguished guests were present.

An inspection was made of the Mortlake Works of the Australian Gas Light Company, which is the sixth largest undertaking in the British Empire.

Luncheon was provided by the Australian Gas Light Company in a marquee on the tennis courts at the works; and a vote of thanks was proposed by Mr. R. G. Parsons, President-Elect, for the many kindnesses displayed by the Company to the members of the Institute during their visit to Sydney.

An inspection was also made of the works of the North Shore

Mr. A. Wilson (President), **Mr. P. C. Holmes Hunt**, Mr. G. M. O'Dea (Secretary, South Australian Gas Company), **Sir H. Cowan, M.P.**

Mr. H. Tindale (Engineer for Works, Australian Gas Light Company), **Mr. P. C. Holmes Hunt** (Chairman and Managing Director, Colonial Gas Association, Ltd.).

Mr. F. E. Bird (Australian Manager, West's Gas Improvement Company, Ltd.).

Gas Company at Oyster Cove, where many things of interest to gas men were seen.

The social side was well catered for by the President, Mr. Andrew Wilson, who with Mrs. Wilson held an "At Home" at the Royal Golf Club, Sydney.

The new President—Mr. R. G. Parsons, Manager of the Footscray Works of the Colonial Gas Association, Ltd.—and officers for the ensuing year were installed, after which the retiring President was presented with a handsome crystal service, with a rose-bowl for Mrs. Wilson.

SPECIAL COMMITTEE NO. 1: REPORT ON STANDARDIZATION OF ACCOUNTS.

This matter was referred from the first annual meeting of the Institute; and during the year several meetings have been held with a view to preparing, for the consideration of members, a standard form of accounts in the industry.

That such a course of action is desirable is evident from inquiries that have been made from time to time as to the items included in the various debits appearing in the revenue accounts of the larger gas undertakings. It has been found that in many instances these debits do not comprise the same charges, and, therefore, for purposes of comparison, are practically useless. In an endeavour to reach the highest standard of efficiency, it should be possible in every gas undertaking to compare the relative operations of other undertakings in the industry; and this, it may be taken, is the chief objective in the compilation of a standard form of accounts. There are, of course, particular and peculiar domestic arrangements that are not common in the industry; and where such exist, special mention of them should be made in the compilation of the standard form already referred to.

It is, of course, not suggested that companies should alter their published form of accounts, as in the various States these have to conform to the standard requirements provided by legislation; but, as already pointed out, there should be available to members information showing the results of the various operations in the respective undertakings. A point the Committee stresses is that all details furnished are to be treated confidentially. It is, however, most emphatic in its recommendation that comparative figures should be supplied, as such a course would be in the interests of efficiency.

Members will readily appreciate that, with the diversity of systems obtaining in the different undertakings, it has been somewhat difficult to collate the information which has been supplied in answer to the questionnaire submitted by the Committee, and therefore the standard form which appears hereunder is only suggested with the idea of provoking constructive criticism. At the same time it may be pointed out that this form, in the main, complies with the schedule under the Gas-Works Clauses Act of Great Britain, and, as far as can be ascertained, is that adopted by Mr. Field in his published analysis of the figures of English companies. Moreover, in New South Wales, Victoria, and South Australia the same standard form is in use; and, therefore, if adopted, it would enable Australian companies not only to compare their relative results, but also those of gas undertakings in Great Britain. While the larger companies in the States mentioned are using the standard form of accounts already referred to, it has been found that the various items of charge are widely different; and it is the objective of the Special Committee to bring these into line in order that effective comparison may be made.

The Committee then set out in detail the various items.

REPORT OF SPECIAL COMMITTEE APPOINTED TO INVESTIGATE THE BEST MEANS OF COMBATING ELECTRICAL COMPETITION.

Although, to-day, the most common contribution of electricity to the home is lighting, it is also a keen competitor in the fields of domestic heat and power. As regards domestic power, electricity may be said to be supreme, for, owing to its extreme portability, it can be used for a multiplicity of domestic operations where motion is required. Moreover, it operates in ways which, although not strictly domestic, nevertheless provide for the amusement and convenience of mankind.

The net result of all this is that electricity makes a tremendous psychological appeal, and it is against this appeal of so versatile a competitor that combative measures have to be considered. It is said that gas is the logical fuel. This is perfectly true. It is also true that electricity is the psychological fuel. Nowadays gas has to be sold as well as made. New conditions demand new methods, and the gas industry must recognize its deficiencies—not necessarily in the inherent merits of its products—but as to the appeal it is making to the public. Even a cursory examination of the methods adopted by electrical propagandists will show their ready appreciation of the importance of this fact, and how electrical appliances—efficient and otherwise—are presented in a way calculated to create an atmosphere of wonderment.

An example of this was found in the "All-Electrical Exposition" recently held in Melbourne, where it would be safe to say that not 15 p.ct. of the exhibits were in direct competition with gas; but it induced people to think "electrically," with the result that they hail electricity as the solution of every domestic problem.

The fact, however, that in the electric restaurant of this all-electrical exposition the heavy cooking was done with gas (though the electric current was available free of charge) in a secluded kitchen remote from the unsuspecting eyes of the public, and was served to its patrons with due display from an electric hotplate as electrically cooked food, was, charitably, not allowed to disturb the impression which the exposition was calculated to create.

How can the public be persuaded, by both logical and psychological means, that heat and gas are synonymous? Logic deals with the laws of reason. Psychology deals with the laws in accordance with which people are found by experience normally to think and reason. There is, of course, a fundamental difference. The former is built upon indisputable laws, and the latter upon the elements of the mind—often reasoning illogically—which control normal thought.

The logical appeal consists of:

(1) Comparative costs of gas and electricity.
(2) Comparative costs of gas and electrical appliances.
(3) Comparative costs of gas and electrical appliances (as to upkeep).
(4) Convenience and economy (education of the public).
(5) Fuel conservation.
(6) Relations to hygiene.

Your Committee is of the opinion that the time is ripe for the establishment of a laboratory in the industry where comparative and impartial tests of various appliances could be undertaken. It would then be in a position to come straight out into the open, and place actual facts before the public. Such a laboratory could, moreover, develop designs of gas appliances, with the object of securing fuel economy.

In the electricity industry there is considerable research by the makers of appliances. This research indicates a desire for efficiency which might well be emulated by the gas industry. It is well known, for instance, that the electric hotplate is, perhaps, the most inefficient piece of electrical apparatus in existence—the open type having an efficiency of only about 20 to 25 p.ct. when starting from cold—but there is doubtless a great amount of experiment going on in this direction alone; and it cannot be said that some entirely new design will not result, for failure sometimes teaches more than actual success.

The question of stamping all approved gas apparatus, the need for which has given your Committee much consideration, could be properly administered under the ægis of such a laboratory. The importance of selling only those gas appliances of approved efficiency—without which disfavour must result—cannot be over-estimated. It is a fact to be deplored, for instance, that the safety and efficiency of gas bath-heaters should in any way be in the hands of those who, in many instances, do not understand the first principles of combustion.

As regards the education of the public, data in respect of the amount of gas used for the various needs of everyday life could be obtained, and quantitative experiments of great importance carried out. The need for education of the public is apparent, for it may safely be said that where it is possible to waste fuel it will be wasted. The relation of gas to hygiene is also worthy of greater advancement. Electrical propagandists make much, for instance, of the absence of alleged "poisonous fumes" with the use of their apparatus. The inference is clear; but it is overlooked that the products of the proper combustion of gas fulfil an elemental requirement of proper ventilation.

Not only could these and many other facts with a distinct logical force be ascertained by a central laboratory, as suggested, but the information could be presented in such a way as to have a telling effect on the minds of the people.

The psychological appeal consists of:

(1) Propaganda.
(2) Service to the consumer.
(3) Public confidence in any appliance operated by gas.
(4) Modern methods catering for the convenience of the public.

The persistent advocacy of electricity compels a corresponding advocacy of the virtues of gas. This can best be done by propaganda. In these days of travel and extensive newspaper distribution, gas well advertised in one place should be gas well advertised in every place of importance throughout the Commonwealth. The converse is true, unfortunately, that gas badly advertised in one place is gas badly advertised in another.

The need for general publicity on commercial lines is apparent, and the point which should be emphasized is the service which the gas industry can give to the public. It is to this fact that the British Commercial Gas Association owes its existence. In Australia there is no such guardian of the gas industry, although the electrical industry has no fewer than ten Associations watching its protection and fostering its advancement. There are, of course, some large gas undertakings here doing excellent propaganda work; but the best they can do must necessarily be poor in relation to what could result from an organization for the common good.

Though propaganda can do much, it cannot do all. It must have the support of service. The public wants heat—not gas.

An undertaking's interest, consequently, should not stop at the meter. The essentials of good service are regular quality, constant pressure, systematic inspection, and (whether it be free or otherwise) proper maintenance of appliances. Deficiencies in these respects nullify the effects of the best propaganda, waste the money so spent, and invite the electrical salesman. Good service alone will dispel old prejudices, and convert dissatisfied consumers into satisfied ones.

Public confidence in gas appliances follows as a corollary of good service; but there is the need at the same time to remove their safety beyond all possibility of doubt. This applies particularly to bath-heaters. The unfortunate fatalities which occur—comparatively rarely, it is true—do much to prejudice gas, and offer a point of which electrical salesmen are not slow to avail themselves. The almost entire absence of control in the fixing and manufacture of these appliances constitutes a constant menace to the best interests of the industry, and should be removed, the first step in which would be the proper stamping of appliances by a competent authority, as already suggested.

Modern methods include the modernizing of all branches of the industry coming in direct or indirect contact with the consumer. There are many employees in the industry who come into direct contact with consumers. Are they potential avenues of goodwill for the industry? Can they handle people skilfully and speak properly?

In the field of industrial gas the logical appeal is, of course, paramount; and the use of gas therein can be furthered by the ascertainment of facts, the balance of which, if in favour of gas, must decide its use. In the domestic field, however, the appeal is more psychological; and the aim should be to increase the popularity of our commodities. This can be done by removing wrong impressions, by creating a new point of view, by emphasizing the many advantages and economies of gas and the reliable service which it can give.

REPORT OF CORROSION COMMITTEE: SUMMARY AND RECOMMENDATIONS.

As a result of a review of the information available on the problem of corrosion, your Committee has concluded that there is no universal remedy for the prevention of corrosion of iron or steel structures. In steel or wrought-iron structures it is important that corrosion should be guarded against, and precautions taken adequately to prevent the cause of corrosion, or so to treat the structure as to minimize the risk of damage through failure. Opinions differ with regard to the quality of the metal itself as a factor in corrosion. American evidence appears to show that for atmospheric corrosion, and possibly gaseous corrosion, irons containing traces of copper may be preferable to the so-called commercially pure irons; but the Wrought-Iron Tubing Committee of the Institution of Gas Engineers recommends that it is "desirable that steps be taken by the gas industry to ensure that gas barrel supplied to the industry is composed only of superior quality, puddled wrought iron." This Committee subsequently prepared a specification for wrought-iron gas, water, and steam tube, and it was adopted by the Council of the Institution of Gas Engineers on Feb. 9, 1927. Your Committee recommends that steps should be taken to adopt, wherever possible, the specification referred to.

Until further knowledge and information are obtained concerning the causes of corrosion of materials used in the gas industry, your Committee recommends that the best course to follow is:

(1) With regard to the composition of the gas:
  (*a*) To make as pure a gas as possible, and to reduce the oxygen content to a minimum—to the extent of its entire elimination, if this be practically possible.
  (*b*) The gas should be efficiently cooled and purified—that is to say, all traces of ammonia and cyanogen should be removed. The carbonic acid present in the gas should be kept to a minimum by the better use of ammoniacal liquor in the washers and scrubbers.
  (*c*) The absolute removal of sulphuretted hydrogen.
  (*d*) As no corrosion can take place in the absence of moisture, your Committee suggest that earnest consideration should be given to reducing the moisture content of gas by means of drying.

(2) With regard to protective measures to prevent corrosion from the action of the constituents of the gas, or from the action of the constituents in the soil, your Committee cannot suggest anything better than the utilization of paints which have proved satisfactory under working conditions, and bituminous coverings. The use of lime round the service pipes is a protective measure worth trying under certain conditions.

Attention is also drawn to the utilization of cement-lined pipes for the prevention of internal corrosion.

With regard to soil corrosion, it would appear that very little information is available in Australia regarding corrosion from this source. Your Committee recommends that, in view of the importance of corrosion to the gas industry in Australia, a systematic research should be conducted with the object of gathering information, and determining the best means of combating its destructive action, and suggests that the work of the chemical staffs of the various gas undertakings be co-ordinated, and that a sub-committee consisting of chemists drawn from the staffs of the larger gas undertakings be appointed to carry out research work, under the direction of the Corrosion Committee. One of the first researches which should be undertaken by such a sub-committee is that of soil corrosion of distributing mains and services. In order that continual records should be available, it is proposed that investigation should be systematically made in the various capital cities into this subject, keeping records as to soils, analyses of gases, data as to electrolysis, and any other matters germane to this important subject.

Records should be transmitted to the General Secretary for correlation every six months, for consideration by the Committee dealing with the matter.

The financing of any scheme of research is important; but it is suggested that the incoming Committee should inquire into ways and means of reaching the desired end, and make recommendations.

THE "WORK METER."

Registering the Performance of Machines.

An instrument designed for recording the performance of machinery, known as the "Work Meter," has been put on the market. The proprietors are Work Meters, Ltd., of 25, Victoria Street, S.W. 1; the distributors are Messrs. Lewenz & Wilkinson, Ltd., of the same address; and the manufacturers are the Automatic Telephone Manufacturing Company, Ltd., of Liverpool.

In a booklet describing the apparatus, it is stated that it records the amount of work done; the time taken to perform the work; the exact time when such work was done; every stoppage, and its duration; the speeds at which different parts of a machine are working; the speeds at which different machines are working; and defects—as, for example, excessive belt slip—which may be the cause of under-production.

The "Work Meter" comprises two essential parts: The impulse sender, which is linked to, and driven by, some revolving or reciprocating member of the machine under observation; and the recorder, which produces, on a paper chart, the details of the machine's performance. In addition to these two members, a connection is made to a clock, which transmits periodic impulses to the meter. These impulses advance the chart paper at a predetermined rate.

Each instrument is designed to record the motion of twelve machines or machine parts; and the charts, which are arranged to run continuously for 31 days, take the form of closely-spaced perforations, representing continuous and regular movements of the machinery under observation. Stoppages or irregularities are indicated by corresponding gaps or spaces in the otherwise unbroken sequence of the perforations. Thus the chart is an infallible time record of each machine's performance, and enables those responsible to investigate and rectify any abnormal condition.

The principle on which the "Work Meter" operates is simple. In addition to a contact-making device, the impulse sender contains an adjustable gear, which can be set to suit the speed of any machine to which it is attached; thus enabling electrical contact to be made at pre-arranged fixed periods, irrespective of the normal speed of the machine by which it is driven. The impulse sender is connected in series with the corresponding electro-magnet on the recorder and a battery or other source of power. Every time the contact maker in the impulse sender operates, the magnet is energized and the chart receives a perforation. This action takes place normally once every minute or other pre-arranged period. Should the speed of the machine vary, the variation will immediately be indicated on the chart, which will likewise record the effect on production.

The apparatus is most useful for the control of air compressors, pumps, &c., and for recording the performances and idle periods of conveyors and transporters. Its use can also be extended to the boiler house.

A NEW DIAGNOSIS OF THE COAL TROUBLE.

At a meeting last month of the Manchester Section of the Society of Chemical Industry, a paper entitled "A New Diagnosis of the Coal Trouble" was read by Dr. JAMES A. BOWIE, M.A. (Director of the Department of Industrial Administration at the Manchester College of Technology), who regards "depression and dissension" as the two problems in the coal industry. They are, he holds, distinct problems, but inter-related. What reduces dissension will of necessity alleviate depression; but the converse is not true. Dissension does not necessarily diminish with lessened depression; but, on the other hand, it seems certain that in the coal industry dissension will endure while depression remains, if for no other reason than that the miners think they possess a prescription, which the owners stubbornly refuse to take, for curing that depression. From facts quoted by him, the conclusion would, he said, seem to be inevitable that the British coal industry is faced with a shrinking demand which will not yield to the stimulus of price reduction—a conclusion which is reinforced by the fact that modern ingenuity has devised methods of economizing in the use of coal and of developing substitutes.

Denying that the present plight of the industry is due to the heavy burdens it has to carry in capital charges, local and national taxation, and high costs of transport, the author urged that the coal question can never be seen in its proper perspective unless it be envisaged as a problem inherent in the very nature of the industry itself. The truth is that the coal industry has grown up under conditions which inevitably mean over-expansion, leading to unemployment or under-employment, low wage rates, and lack of profitability. For a time, this "congenital vice" of the industry may be veiled by a continually growing demand for its product, by the gradual operation of diminishing returns, or by a reduction in hours; but under static conditions it is certain to assert itself. The coal problem has undergone many phases; but in its fundamentals it is neither new in Britain nor peculiar to Britain. To enter the industry in a small way requires little capital; and various factors have resulted in rich prizes being offered to entrants over short periods of relative scarcity. There were in Britain in 1923 about 700 separate coal undertakings employing less than 100 men each; one-third of the country's mines were under 30 years old; and the average age of the larger mines, employing 500 workpeople or more, was only 51 years. Though a large number of the smaller mines remain open for only a few years, the existence of numerous infant units, a significant proportion of which struggle to maturity, means a continual accretion of the productive capacity of the industry. Even mines which cannot be worked remuneratively remain for long in productive existence, anchored to their irredeemable capital. A coal mine cannot be converted into any other type of business; and if a hard-pressed colliery owner does succeed in selling his pit as a "going concern," all that happens is that a new undertaking rises out of the ashes of the old, with reduced capital charges and losses written-off, and goes on dumping its coal on an already surcharged market. Further, in the mining industry conscious steps have been taken to prevent competition acting as the precipitator of the sub-marginal firm. The problem is the Malthusian one applied to colliery concerns. They tend to multiply more rapidly than their means of subsistence. The result is that, apart from abnormal famine periods, supply must always tend to swamp effective demand, and force prices under a remunerative level.

Upon this showing, the problem is that of an excess productive capacity struggling to supply a shrinking world demand, with the inevitable result of uneconomic prices, weak sellers, unemployment, low profits, or losses all round. Whatever is done or left undone, the author sees no escape from hardship; but there is a choice of evils. There may be left to the impersonal play of uneconomic forces the disagreeable task of shedding the inefficients, or there may be an attempt to contract the industry quickly, consciously, and mercifully within the business limits of its shrunken demand. In his view, merely to impose restrictive measures on what are no more than symptoms or effects of the real trouble—such as excess output or uneconomic selling prices—does little other than perpetuate the real trouble. To fix minimum selling prices, to restrict production by organized short time, by rationing output, or by establishing pooling or contract-allocating associations, is simply to assist the weak to survive, and so to produce exactly the opposite result from what is desired. They may be expedient in meeting a temporarily depressed demand, when it is desired and intended to keep the weak units in existence; but when the problem is one of a permanently shrunken market, they merely weaken the strongest units in the interests of strengthening the weakest and least desirable ones.

TRUSTIFICATION.

The first thing to be aimed at, Dr. Bowie thinks, is the elimination of the uneconomic producer; and the second, the increasing efficiency of the remainder. The policy which has recently been described as "100 p.ct. trustification" is totally unsuited to the coal industry in this country. In existing examples which are so often quoted, the units are geographically concentrated, while the coalfields in Britain extend from Fife to Kent. Then there are the wide diversity between the producing units and the great difficulty in making a satisfactory valuation of colliery properties. A further impediment to trustification lies in the composite character of the industries which are allied with the working of collieries. Again, the coal industry is not ripe for trustification, inasmuch as it is not concentrated in the hands of a comparatively small number of large producers, as was the case in the United States and Germany, where the absorption and amalgamation of various enterprises preceded the development of effective combination, and, in addition, various price arrangements existed between the producers.

STEPS TO TAKE.

It is suggested, as a first step to the elimination of the uneconomic producer, that the coal industry should be required to adopt the usual procedure of paying an irreducible money wage to each of the fifty or so different classes of workers it employs. This would mean that depression would be felt first by the weakest units, which could not afford to pay the irreducible figure; and this is both socially and industrially desirable. Then, in addition to ensuring the precipitation of the weakest units, it is equally necessary to prevent the indiscriminate entrance of weak sellers into the industry. For this reason, and for others, the exploitation of the mineral resources of the country should be conducted with more regard to the interests of the nation and of the colliery owners, and with less to those of the fortuitous owners of these rights.

The improvement of industrial relations was pointed to by the author as an attempt to tackle the second big problem of the coalfields. The unique agreement of 1921, he said, was meant to deal with the problem of wage-adjustment, but was never at any time adequate to it. The personal incentive to industry which is the general need to-day can best be provided at the pit, where men meet and work together; and it must imply some relationship between the parties other than that of mere bargainers. Partly it is a matter of considering the miner's welfare; but even more important than that, it means the cultivation of a new relationship between the parties, by some degree of exchange of function. Control sharing through pit committees would not by itself be adequate; while cash profit-sharing would merely introduce a fresh set of frictional contracts. The most promising solution would seem to lie in some form of ownership-sharing, freely introduced where conditions are suitable, and not by any method of legal compulsion.

OTHER VIEWS.

At the opening of the discussion on the paper, a communication was read from Sir Richard Redmayne, K.C.B., who found himself very much at variance both with Dr. Bowie's conclusions and with his process of reasoning. He claimed that at the majority of collieries the relations between management and workmen are excellent, and after further criticism of statements contained in the paper concluded: "Time and space do not permit of my now putting forward a detailed prescription; but were I asked to give it in short, I would do so by stating 'district amalgamations' as the cure. I have no fear as to the ultimate revival of the coal mining industry of this country."

Another written contribution was by Dr. Henry Louis, M.A., D.Sc., who expressed cordial agreement with much that was contained in the paper. He, however, does not agree that the world's demand for coal is shrinking—holding that this demand would be as great as ever, if the world could afford to pay for it. Dr. Louis reminded the meeting that he put forward a scheme some years ago based on the idea that a portion of the excessively high earnings in prosperous times should be set aside, under proper safeguards, to make up low earnings which must inevitably follow, because the greater the boom the deeper the following depression. He still maintains that this proposal is one well worthy of adoption. The objections to Dr. Bowie's proposed remedies will, he thinks, be obvious.

The author replied that the suggestions put forward in the paper were not to be described as remedial; they were only first steps to be taken.

"Tecalemit" Lubricating System.—Messrs. Tecalemit, Ltd., 10, Little Portland Street, W., have issued the first number of "Tecalemit News," "to emphasize the importance of adequate and systematic attention to all parts intended to be kept lubricated, and to impress on all concerned the economy of the 'Tecalemit' system—its wide and extending use for all classes of machinery." In this there is an article on Colonel Lindbergh's flight across the Atlantic. The engine he used has the reputation of being one of the most reliable ever constructed; and in this connection the use of "Tecalemit" lubrication to an important part of the mechanism is noteworthy. "Tecalemit" is excellent for oiling the bearings of conveyors, &c.

METHODS OF RADIANT HEATING.

The Panel System.

In a paper which he read before the Royal Society of Arts, at John Street, Adelphi, on Wednesday evening, Jan. 18, Mr. ARTHUR H. BARKER, B.Sc., M.Inst.C.E., dealt with "Methods of Radiant Heating," which he discussed after explaining in an interesting manner what is expressed by the terms conduction, convection, and radiation. A large audience was presided over by Prof. A. E. Richardson, F.R.I.B.A., F.S.A.

The methods of radiant heating, Mr. Barker said, can, generally speaking, be divided into two classes—high-temperature (or incandescent) methods, and low-temperature (or distribution) methods. The former consists in maintaining some radiating body at a high temperature at which each point of the hot surface gives off a beam of rays. Such a beam is of a number of different wave-lengths, extending far down into the infra-red. The infra-red rays carry the most energy, though the luminous rays, from the green downwards, are of importance. In the other class the radiation is produced from a larger area of surface maintained at a much lower temperature. These surfaces are exposed to the interior of the room, and give-off beams of rays, all of which are in the infra-red region—that is to say, the beam they give is entirely non-luminous and invisible. It is found by experience that radiant heat of this character can be utilized to make a room comfortable at a much smaller expense of energy than when the radiation is of a luminous character. The reason probably is that glass is much less diathermanous to rays of longer wave-length, and much more so to waves of shorter length. Thus a large part of the heat when introduced as luminous waves passes through the glass of windows, and is lost. Also, wall surfaces will absorb a much larger proportion of the luminous heat impinging on the walls of a room, but heat is absorbed by the surfaces, and is rapidly conducted to the outside, and is lost in the outer air; whereas a much greater proportion of the dark heat would be reflected back into the room. He does not think it is possible for anyone to distinguish by sensation incandescent heat from the dark variety.

THE GAS FIRE.

For countless years methods of heating by incandescent radiation have been in use, of which the oldest, and by far the commonest, is the old open coal fire, which allows the greater part of the convected heat to escape up the chimney with the smoke, and distributes the remainder, in the main, in the form of radiant energy. This open fire process has been improved in efficiency, convenience, and economy, by extracting from the solid fuel a gas of which the advantages are that it is readily carried to the point where it is to be burnt, that its combustion leaves no solid residue, and that the rate of combustion can be regulated by a tap. These are very great advantages. Functionally the effect of a gas fire is identical with that of the open coal fire. There is no difference between the physical effects of heat from a coal fire and a gas fire fitted with a suitable flue. The idea that a gas fire provides drier radiant heat than a coal fire is merely absurd. Given the same chimney, the only real difference between them is the attractive and capricious variability of the one and the controllable constancy of the other. That is a difference which the wise makers of gas fires should try to reduce.

BOWL GAS HEATERS.

It was pointed out by Mr. Barker that gas can also be used for the local production of luminous radiation, but not without the generation of a corresponding amount of convection. The type of apparatus known as the bowl fire, now becoming fairly well known, is extraordinarily useful in certain circumstances. This appliance has an incandescent mantle at the centre of a large hemispherical copper reflector. It distributes approximately 45 p.ct. of the energy of the gas in the form of a beam of radiation which can be transmitted over considerable distances through a room, as the beam is only slightly divergent. It is possible with three or four of these appliances at the corners of a large cold room to direct a beam of heat on a person sitting in the centre of the room in such a way that he will feel perfectly warm. The drawback to their use is the generation of the products of combustion, which foul the reflector, and which must either be allowed to mix with the air of the room or be got rid of somehow.

DARK HEAT.

After making reference to electric fires, Mr. Barker turned to the consideration of appliances giving dark heat. The essence of this method is to maintain exposed to the room interior a large surface at a medium temperature, generally not exceeding 120°, but sometimes much higher. About 60 p.ct. of the heat given-off from such a plate is usually in the form of radiation, and in some cases, he believes, much more, depending on the movement of the air in contact with the plate. He went on to say that any given amount of heat spread over a large surface at a low temperature is much more effective in producing a feeling of comfort in a room than if the same amount of heat is spread over a smaller surface at a higher temperature. The principal advantage of this radiant method is that it dispenses with the feeling of stuffiness which always exists to a greater or less extent when the means of transmission are purely convection, and which forms the principal obstacle to the general adoption of central heating. The second advantage is that a large reduction in the cost of heat is effected by it. One of the drawbacks is that the effect of the hot surface is diminished in situations where an unobstructed view of the heating surfaces is not obtainable. This implies that more heating units are necessary than would be required with convective structures, which tends to increase the first cost. Where the heating surface is placed on the ceiling, it can hardly be obstructed by furniture. It is therefore likely that in future much of the heating will be done by surfaces of this character fixed on the ceilings, though this position has also its disadvantages—especially the danger of damaging tables and other furniture placed immediately below, and the floors immediately above.

PROGRESS OF THE PANEL SYSTEM.

Mr. Barker explained that he conceived and patented the idea of warming the walls directly by burying small hot-water pipes in the plaster, through which hot fluid could be circulated. The heat of the fluid was thereby transmitted by conduction through the pipes conveying it, and through the plaster to the surface, which thereby became warm. Various practical methods of accomplishing this result have been developed since that time. Originally it was proposed to cast the pipes in a separate slab of special plaster material of a quality which would not crack by the heat, to be built into the wall. Afterwards it was found practically possible, and more convenient, to cast these slabs in position on to the wall, by first putting up the coil, then connecting it to the circulating pipes, and covering it with the plaster. The drawback arising from this alteration is the difficulty of avoiding a cracking of the plaster, unless the temperature of the water is kept very low. Many different kinds of plaster have been tried; and even at present a wholly successful solution to this problem has not been found. Later, with the development of concrete buildings and concrete floors, came the proposal, which has been extensively adopted, to cast ready-made steel coils in the concrete of the walls or ceilings—especially the ceilings—the pipes all being welded together and completed before the concrete is cast. Thus the pipes become firmly imbedded in the concrete, and any hot fluid passing through them will have the effect of heating the mass of concrete and producing a warm building, without unduly heating the air.

GAS HEATED METAL PANELS.

Metal panels have now been introduced, and will probably become very general, with gas or electricity as the heating medium. A gas flame is arranged behind the panel, which will supply heat all over it. The products of combustion are sucked through the conduits by a small extractor fan, which withdraws them and discharges them to the outside. By this means the panel is warmed all over, the same as when heated by water or steam. In a similar manner the passages in the panel can be supplied with electric coils through which a current of electricity from the power mains will generate the necessary heat, to be distributed over the surface. The effectiveness of this method makes possible heating by gas or electricity in many cases where the expense of convective heating would be too great. This renders practicable central heating by gas, especially of buildings where no flues are provided, without the products of combustion contaminating the air of the building. Automatic devices are supplied, by which the gas is turned-off if the suction fails, so that there may be no danger of escape.

This application has also the great advantage that the whole of the gross heat in the gas is employed—that is to say, the products of combustion, on reaching the fan, are generally absolutely cold, so that no heat is thrown away in the products. This renders possible the heating of a building by gas at a cost which does not greatly, if at all, exceed that of heating by hot water radiation. It is certainly immensely below the cost of heating to an equal degree either by open coal fires or gas fires.

A WIDE SUBJECT.

These are only a few of the many methods which were enumerated by Mr. Barker, and illustrated by an extensive series of lantern slides.

The paper was followed by a good discussion, which was opened by the Chairman with the jocular remark that whereas in the "dark ages" there was incandescent heat, in these enlightened times people seemed to be getting "dark heat." Mr. Llewellyn B. Atkinson (a Past-President of the Institution of Electrical Engineers) drew attention to the necessity of considering humidity in connection with the heating problem; and, after some remarks on heat transfer by Dr. Margaret Fishenden (of the Fuel Research Board), Prof. F. L. Hopwood asked for advice as to the heating of the bedroom and the sick room, where the minimum portion of a person was exposed. Dr. Elwin H. T. Nash declared there was no doubt whatever that

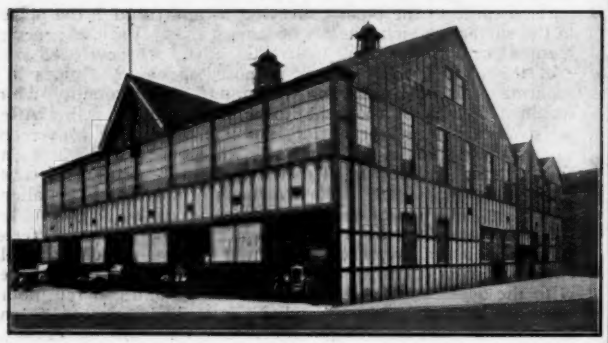
ceiling panel heating, at any rate so far as schools were concerned, had come to stay. It was better for the purpose than wall panels. Major P. H. Richardson pointed out that heating and ventilation should be considered together. There seemed now to be a tendency to think of heating, and heating only; and if this were continued, they would arrive at a stage when there would be heat, but no fresh air to breathe.

In his reply to the various points that had been raised, Mr. Barker emphasized the fact that the paper discussed methods of radiant heating, and therefore he had not dealt with the very broad subjects of humidity and ventilation. He could not see why radiant heating such as had been suggested that night should not be equally suitable for bedrooms as for other places. The most comfortable method of heating was the wall panel, and not the ceiling panel, though he believed the latter was more economical.

A LARGE GAS-EQUIPPED CANTEEN.

A large number of guests were invited to be present at the opening ceremony of a new canteen provided by Messrs. Turner Bros. Asbestos Company, Ltd., at their Trafford Park Works, Manchester, on Wednesday, Jan. 18.

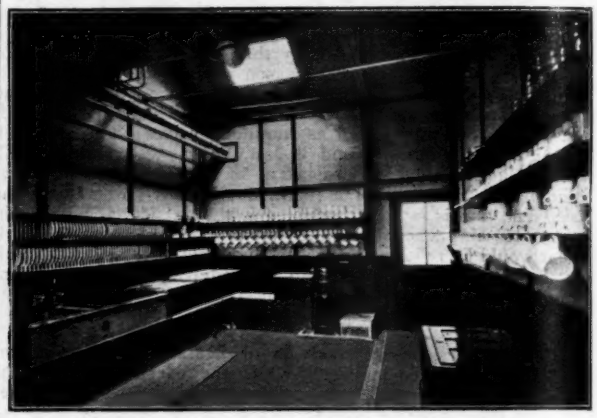
The building, which stands apart from the main works of the Company, is constructed entirely (except the steel framing) of the asbestos products of the Company, and is therefore almost completely built of material provided by the firm themselves on the site. Even the exterior walls, ceilings, and floors are mainly composed of asbestos, the raw material of which has been brought from the Company's seven asbestos mines in Rhodesia. Asbestos being, as is well known, a very poor conductor of heat, the building will thus be extremely cool in summer by excluding the excessively powerful effect of the sun's rays, while in winter, when the method of central heating is in operation, the warmth will be retained in the interior of the building, and not radiated to the outside atmosphere.



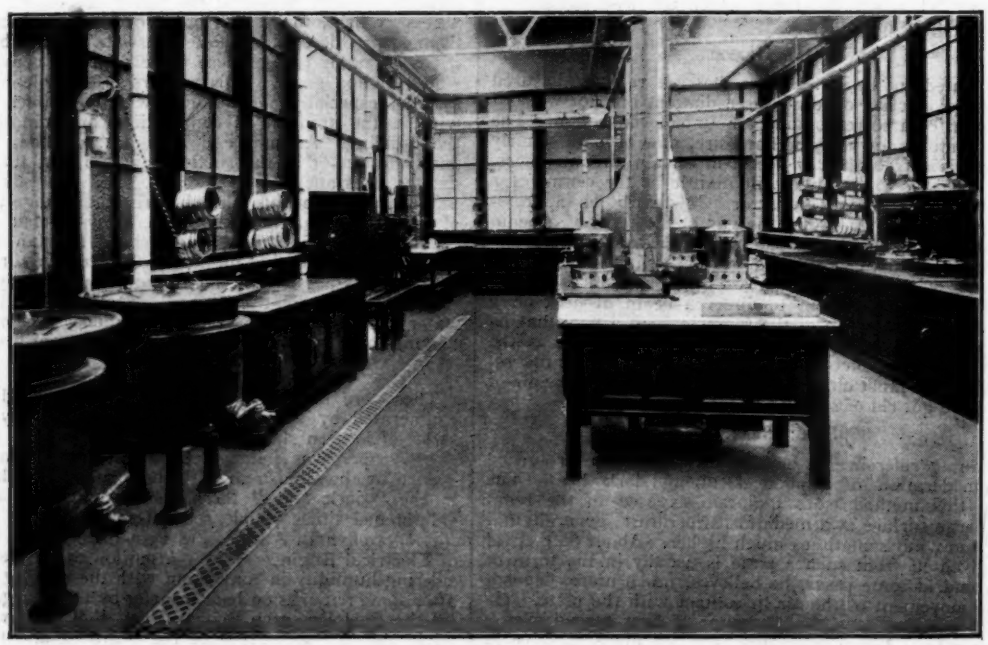
The Canteen Building.

Although, to superficial observation, the building presents a remarkable lightness of construction, as well as refined architectural beauty, it is, as a matter of fact, of very sound and substantial design, and is thoroughly capable of withstanding the effects of the most powerful gales, besides being absolutely waterproof and frost proof. It stands as an object-lesson of the excellence of a modern method of building construction; and there is little doubt that its style of design and lay-out generally will be regarded with much interest by manufacturers and industrialists throughout the world. The canteen itself is a type of building which should particularly appeal to refreshment caterers who contemplate opening new establishments either in large or in small centres of population. The Architects are Messrs. Butterworth & Duncan, of Rochdale.

There is accommodation for approximately 1000 workers at one sitting; and it will be seen from the following that the kitchen appointments are of the most up-to-date description. They comprise a built-up central gas range, canteen and restaurant type, measuring 7 ft. 6 in. long by 4 ft. 3½ in. wide by 30 in. high, with six ovens, three on each front. The ovens are double-cased and packed with non-conducting material. The outer casing is of cast iron, and the inner linings of porcelain enamel sheet steel; and there are heavy cast-iron side-hinged doors. The hotplates are fitted with a good assortment of boiling rings and simmering burners, and also a double grill at one end. The ovens are brick-domed, and equally suit-



The Pantry.



THE GAS-EQUIPPED KITCHEN.

able for roasting or pastry; and all internal fittings and hotplate and oven burners are easily removed for cleaning. The oven flues are gathered into one central exhaust pipe, and carried away above the hotplate. The installation has been manufactured and supplied by the Carron Company, of Falkirk.

In addition, there is a large type three-pan fish-and-chip range, gas heated. Each pan is 24 in. by 22 in. by 8 in. deep, fitted with the latest type of adjustable burners. It is constructed from blue steel. The exhaust steam and gases are carried away in one central pipe from the top. This range was manufactured and supplied by Messrs. John Rouse, Ltd., of Oldham.

The following Directors of Turner Bros Asbestos Company, Ltd., and of other companies with which the firm are allied were present: Mr. Samuel Turner (Vice-Chairman of Turner & Newall, Ltd., the Parent Company), Mr. B. E. Williams (Director-in-Charge of the Trafford Park Works and Turner Bros. Asbestos Company, Ltd.), Mr. J. Fox and Mr. H. Hanson (Directors of the Trafford Park Works), Mr. H. Jones (Director-in-Charge of the Rochdale Works), and Mr. D. Kenyon and Mr. F. Bussy (Directors of the Rochdale Works). The guests were escorted round the works by Mr. Williams.

At the luncheon proceedings which followed, the Chairman (Mr. Samuel Turner), in formally declaring the canteen open, spoke of the amicable relations which had always existed between the Company and their employees. The solution of the industrial problem appeared to rest in the creation and maintenance in the workshop of an atmosphere and conditions in which the normal man or woman who worked there could be contented. The Directors had long ago accepted this principle, and the task it involved. The canteen was one contribution only towards the solution of the problem. Year in and year out, every assistant throughout the works had received the solicitous consideration of the Directors. They had sought to make his wage as liberal as possible, and not as little as possible; his surroundings they had tried to make as healthy and as comfortable as possible; and his task had been kept well within the scope of his powers. In return, the Directors had expected, and had received, loyal and faithful service. He added that a constant stream of new products was being marketed by the factory—among others "Permanite" glazed tile sheets, and a new form of asbestos corrugated roofing, the radii of which were symmetrically equal. "Sindanyo," a high-class insulating board for electrical purposes, was also one of the Company's products.

AMERICAN GAS ASSOCIATION.

NOTES FROM REPORTS AND PAPERS.—Fifth Article.

Large Industrial Gas Installations.

Many remarkable examples of large consumptions of artificial gas for special processes were quoted in a report on outstanding industrial gas installations. At Milwaukee, a furnace 195 ft. long, able to deal with 25 tons in 24 hours, has recently completed a successful year in the "malleableizing" of iron castings; and a second unit is in contemplation. There is in Chicago a large compensating-type carburizing furnace; while Syracuse possesses what is claimed to be the largest carburizing furnace in the world. It is 385 ft. long. At one works in Toledo, where the operations include annealing, hardening, carburizing, and also billet heating for forging, the monthly gas consumption is 60,000,000 c.ft. This is a stupendous installation for artificial gas. In Detroit, the quantity of gas used for steel heat treating has increased from 40,000,000 c.ft. per month to 85,000,000 c.ft., and this in a year of comparative slackness in business, as well as in the face of a formidably entrenched electrical situation. Detroit has been active in the conversion of steel-treating equipment from older and inefficient types to modern methods of fuel application. In one plant, where 4,000,000 c.ft. of gas per month are used for annealing iron castings, the furnaces have been converted to high-pressure gas, with improved application and lowered fuel consumption.

Industrial and Commercial Incineration with Gas.

Another Committee reported that heavy-duty incineration with gas as fuel is not yet in common use, except in natural gas districts; but quite a number of installations for industrial and commercial use have already been made; and the convenience, cleanliness, and ease of control of gas give reason to anticipate many more. An incinerator of the firebrick type to burn (say) 350 lbs. of garbage and rubbish hourly would be equipped to use about 1500 c.ft. of manufactured gas per hour. This would be very much more than its normal consumption; the purpose being to ensure quick starting, and especially the proper handling of the same quantity of waste, even if it happened to be "wet" garbage with no combustible rubbish. In normal operation in a hospital or a hotel, such a piece of equipment would be operated from six to eight hours, and would actually use from 1500 to 2000 c.ft. of manufactured gas. A hospital of 400 beds or a hotel of 300 rooms would need about this incineration capacity when moderately full. A typical medium-sized country club might have 600 lbs. of garbage on a holiday, with very little rubbish. It would probably be burned in three to four hours, using 800 to 1200 c.ft. of gas. Town gas requires either a booster or an air blower for use in large incinerators. This gives increased efficiency, higher flame temperatures, and a long flame, which is desirable because garbage is usually spread out on a firebrick grate or hearth for burning.

Relative Utilization Efficiencies of Gas and Competitive Fuels and Electricity.

As an appendix to the progress report of the Committee on Economic and Engineering Survey of the Gas Industry, Mr. J. P. Leinroth, of the Public Service Electric and Gas Company, Newark (N.J.), submitted some remarks on this subject, though he admitted that the question is one which can be answered only very generally, on account of the many variables that enter into it. He pointed out that the heat available from fuels is the total heat of the fuel, *minus* the flue losses. The available heat, therefore, becomes less with higher temperature, owing to great flue losses. If one assumes theoretical air-gas ratio, the available heat from ordinary 525 B.Th.U. gas at different temperatures is about as follows:

Deg. Fahr.	P.Ct.
500	90
1000	80
1500	65
2000	50
2500	35

With other than a theoretical air-gas mixture, these percentages become lower. One is impressed with the great losses in the flue gases; and recuperation and regeneration at once suggest themselves. The chemical composition, flame temperature, and speed of flame propagation also affect the efficiency of heat transfer. Thus relative efficiencies of fuels are dependent on a number of factors which render impossible any definite answer to the general question.

It has, however, said Mr. Leinroth, been demonstrated that, properly utilized, 1,000,000 B.Th.U. of town gas will do the same work as:

1,100,000 to 2,000,000 B.Th.U. of oil.
1,500,000 to 2,000,000 B.Th.U. of coal, fired in a producer.
1,500,000 to 4,000,000 B.Th.U. of coal or coke used in the solid form.

Calculating on the basis of the calorific value of the fuels and electricity, and taking coal (12,500 B.Th.U. per pound; 2000 lbs. per ton) at $10 a ton, oil (130,000 B.Th.U. per gallon) at 6c. per gallon, and electricity (3412 B.Th.U. per KW.-HR.) at 1c. per KW.-HR., against gas (525 B.Th.U. per c.ft.) at $1 per 1000 c.ft., one arrives at the following comparative costs:

Per Million B.Th.U.

Coal	$0.40
Oil	0.452
Electricity	2.93
Gas	1.90

Consequent upon the elimination of flue losses, the utilization efficiency of electricity is higher, particularly at high temperatures, than of the fuels. However, the radiation and other losses, reckoning upon the same amount of insulation in each case, should be approximately the same. Assuming twice the efficiency with electricity as with gas, gas of 525 B.Th.U. would have to sell for about 77c. per 1000 c.ft. to compete with electricity at 1c. per KW.-HR.

The selection of the fuel depends on so many factors besides the cost per 1,000,000 B.Th.U. that the above figures have little meaning in connection with some jobs; but when considering the cruder heating operations, they have considerable weight.

Rate Structure Committee.

The Rate Structure Committee believe that the greatest necessity in the gas industry to-day is the reforming of the straight-line rate for domestic consumers, and that any step in this direction will reflect itself on industrial rates, which are now in many situations too high, because the large consumers have to contribute towards meeting the loss on the small ones. The Committee urge all gas undertakings to make such studies and analyses as will enable them to divide correctly their costs under the three headings of customer, commodity, and demand. In this way a scientific rate structure can be created towards which to aim in reforming rates. The Committee are of opinion that the use of a three-part rate, or one which would be practically a three-part rate, can be established at any time for industrial customers, and, if properly applied, will greatly stimulate the growth of the industrial business. For domestic customers, gas administrators will find the three-part analysis an excellent foundation upon which to build.

SCOTTISH JUNIOR GAS ASSOCIATION.

The Second Joint Meeting of the Association was held in Edinburgh on Jan. 14.

Mr. E. L. FARQUHAR (Kennoway; President of the Eastern District), in opening the proceedings, extended a cordial welcome to the President and Members of the Western District. He was pleased to be supported on this occasion by a number of honorary members. The meeting was further honoured by the presence of a distinguished member of the profession, Mr. John Terrace, Vice-President of the Institution of Gas Engineers. This symbolized in a practical way the interest which the seniors were taking in all matters pertaining to the junior members of the gas profession.

Mr. TERRACE said it was his purpose during office to visit as many of the Junior Associations as possible, in order to learn what work was being done. The junior was now much more in the limelight than of old. The Institution Education Scheme had, of late, been improved, and was established on a much wider basis than was at first thought would be the case. He said there had recently been a movement which had resulted in widening the doors of the Institution of Gas Engineers. All members of the Juniors might become corporate members of the Institution.

ORGANIZATION IN THEORY AND PRACTICE.

By JAMES G. DAVIDSON, M.A., B.Com., of Edinburgh.

[EXTRACT.]

The tendency of modern businesses to combine, and the growth and expansion of trading undertakings—resulting in a demand for experts and specialists in all branches—have their counterpart in the demand for a comprehensive and elastic administration and organization. Organization may be regarded as the science of sub-dividing the corporate task into minor activities, each within the scope of individual effort, to obtain the maximum net result in efficiency. In administration and management it is generally recognized that there must be co-ordination. This is no less important in organization.

When big amalgamations take place, we hear so much about the combine becoming too unwieldy, that one is apt to question whether or not there is a limit to which co-ordination can be carried. It is generally agreed that there are practical limitations, though theoretically there is none. As regards gas and similar undertakings, however, where activities are limited to a prescribed area, I suggest that the balance of advantage is always in favour of co-ordination at certain points.

The attack which is usually launched against co-ordination is the loss of the personal touch with the work going on in each particular district. This is not a question of district or of central organization; it is a question of what we can afford. Holding strong views on the supreme efficiency of "function," I have never so far been convinced that work is better and more economically performed by a man responsible for 20 functions in 10 jobs than by a man responsible for 1 function in 300 jobs.

When we speak of organization, we are too apt to imagine a *tabula rasa*. We imagine that we are about to build where none has built before. Such a circumstance is rarely, if ever, met with in practice. In fact, organization often includes destruction, or rather substitution; and every organization may be said to be a re-organization. In a well-established department or industry, the destructive part is often the more difficult. On the constructive side it is only necessary to convince your management that the organization you propose will achieve efficiently and economically the objects in view. On the destructive side, you have still this to do; but in addition you have to prove the inefficiency and inadequacy of the methods you wish to destroy. A far more difficult task is to dissuade the rank and file in business to abandon their customary ways and outlook. The *vis inertiæ* of tradition is not a trifling matter.

Re-organization does not mean the alteration of everything from top to bottom. In practice it is better to concentrate on one small portion of the organization, and perfect it, rather than to have too many irons in the fire at one time. To achieve something in one direction stimulates confidence, both subjective and objective, for others—always bearing in mind that that which is done in piecemeal fashion will be in harmony with your vision of the re-organization as a whole.

In organization the aim should be routine. In the face of popular opinion, this may appear a drastic proposition. What a flood of sympathy is wasted on the routine worker by literary persons who never have done a day's manual labour themselves. These literary highbrows lament the deadly grind of modern industry, and sigh for the good old times, when men put self-expression into their work. Economic historians are not so sure about the "good old times."

We should study as carefully as we can the rational advantages and objections to a particular practice, or the rational arguments for the adoption of another, and then straightway act on our conclusions with regularity and perseverance until the habits have become part of our automatic personality—until they become inbred impulses of the collective mentality of the undertaking.

A particular problem with which we were faced was that of convenient reference to inquiries and orders, of which there are slightly over 100,000 placed with the Department in the course of a year. A record of how these inquiries and orders are handled is necessary; and it is usual to number them serially for reference purposes.

For some reason which I have never been able to discover, an ordinary sheet of foolscap contains 35 lines. An ordinary ledger may contain more or fewer, according to size; but if you make your register page contain 50 lines—*i.e.*, a leaf contains 100—how much more useful it can be. If used in conjunction with files containing exactly 1000, the system becomes very simple. For example, Inquiry 36542 is on file 36, and slightly past the middle of it; it is on page 365; and it is on first side of the page, 8 lines from the bottom. Now this simple method costs you nothing more than the old way; but it saves your nerves considerably in the course of handling 500 inquiries per day.

A matter of routine with which larger businesses of any kind are faced is the establishment of a proper system of forms. If you know what you want, it seems at first sight an easy and straightforward business to draw up a form which will give the desired result. In practice nothing is further from the truth. No two persons interpret a questionnaire in exactly the same way; and the functions which a form can be made to perform in an organization are multifarious. No pains should be spared in the drawing-up of even the simplest form. It is a useful expedient to draw-up each form several times independently at intervals, and then bring the three attempts together, and take the best points of each. Forms can make or mar an organization; and scrupulous care in reviewing every little matter connected with these amply repays the trouble involved. Inquiry, research, reflection, and observation are all needed in the preparation and use of a system of forms.

On occasion we have to give work out to private traders, many of whom, it is surprising to note, are not in a particular hurry to claim their due reward, or too particular in the way in which their claim is prepared. The significance of official order numbers or even correct date and description of the work done seems to be the last thing which occurs to many, with the result that, when belated claims come in, much unnecessary work is involved in identifying and clearing up these accounts. Accordingly we decided that by a process of alignment of forms, we could save the trader the trouble of correctly preparing a claim complete with official references, and incidentally save ourselves untold worry in clearing accounts.

Confidence on the part of the public that the undertaking will duly implement any promise given is difficult to attain, and to keep after it is attained; and this important factor in our dealings with the public requires the utmost untiring vigilance on the part of those responsible for the administration. In jobbing work, one of the major difficulties is to avoid making promises that certain work will be performed at a specified time. It will be readily understood that if promises are made beyond the capacity of fulfilment, disappointment and grumbling on the part of your customers must inevitably follow, especially if the client has had, at his own expense, to make arrangements for the coincident visit of his own tradesmen.

We have a promise slip, which is prepared in triplicate. The functions of this are:

(1) That the original in striking colour should be attached to the papers for immediate circulation.
(2) That an independent intimation is in the hands of the promise control.
(3) That the party giving the promise should take all steps he can to ensure that the antecedent procedure incidental to the fulfilment of the promise is complete.

Much annoyance to the public has been averted, and greater efficiency within the department has resulted from the adoption of the scheme.

Organization should eliminate the manager as the autocrat in all ordinary things, and make him the leader, adviser, philosopher, and friend.

Discussion.

Mr. FARQUHAR remarked that it had been a revelation to learn of the vast amount of skill and foresight necessary to evolve even the simplest routine form. Organization was undoubtedly a science; and alterations of a constructive nature could only be carried out after careful study. The system of keeping a record of promises to consumers, and the procedure marked out to ensure that every promise was followed up, was of particular interest. Sufficient care in promising attention to consumers, he thought, was not taken generally.

Mr. H. H. GRACIE (Edinburgh) pointed out that organization was essential in order that there might be a record of transactions. In planning of this nature it was necessary to keep in view the probability of expansion, so that if it was found that some feature should be added, this might be done without scrapping the system.

Mr. ROBERT FIFE (Kilmarnock; President of the Western District) expressed thanks for the cordial welcome extended to the Western

members. He also was interested in the manner of dealing with promises. Gas undertakings might, through stress of business, forget a promise; but the consumer did not. He asked what was the procedure in the event of a worker finding the premises closed.

Mr. D. VASS (Perth) considered that every manager should study the problem of organization, and discover where the principles outlined by the author could be applied.

Mr. A. B. MUNRO (Edinburgh) observed that scientific management was necessary in these days of ever-increasing business.

Mr. C. D. BLACKHALL (Edinburgh) remarked that, on the introduction of a new system, the fitters were inclined to think that the system was arranged to hamper rather than to help them.

Mr. J. MURRAY (Glasgow) emphasized that re-organization on the instalment plan was a desirable method, as on the first avalanche of new forms chaos reigned. For easy reference, he thought it would be better to have the job sheets arranged in alphabetical order of streets.

Mr. R. J. GAVIN (Kirkcaldy) suggested that fitters were inclined to be suspicious of paper; and on this account forms had to be as simple as possible. He asked if Mr. Davidson could tell what records were kept of mains and service pipes.

Mr. DAVIDSON, in reply, said that procedure in regard to "no access" was that all workers or staff making calls were provided with reply cards, a series of which had been evolved. These showed the delivery number or meter reader's name, or the department concerned, and were left at the premises or sent to the consumer. On return by an incoming mail, they found their way at once to the department concerned. Fitters who usually had a number of jobs in one district always made two calls before using cards. In the matter of accounting for materials, machinery methods were employed in order to account for stocks and to register every article in store. He, too, found that fitters confronted with a new system were suspicious. Explanation, however, usually put matters right. The amendment of forms was really continuous. One had always to observe that any slight change in one form might necessitate alteration in another. In regard to finding forms, it was advisable to have more than one avenue of approach. Estimates, inquiries, &c., were filed in serial numbers, so that if one knew the name, the register would give the number. In addition every form or sheet ultimately found its way to a street folder; so that if the address was known, this would provide another avenue of approach. In the event of the department being unable to fulfil a promise, ample warning was always given. When any new works, such as laying of mains or service pipes, was authorized, a historical card was immediately made out pertaining to that extension, and any work carried out was at once placed on record. These extensions came under review at the end of the financial year.

A hearty vote of thanks was then accorded Mr. Davidson; and the members then took tea together; the Western members being, on this occasion, the guests of the Eastern.

"TUNGSTONE" ACCUMULATORS.

How Robustness and Efficiency are Attained.

A recent demonstration of the construction of the "Tungstone" accumulator, carried out at the premises of the Tungstone Accumulator Company, Ltd., of St. Bride's House, Salisbury Square, E.C. 4, was convincing proof of the soundness of the principles embodied in this unit, which is built with remarkable care and precision.

The process of manufacture of "Tungstone" accumulators, which possess many unique features, is founded on thirty years' practical working experience in precision die-casting. Use is made of high-pressure air or inert gases to force fluid metal at definite temperatures into a steel die of absolute accuracy. The manufacturers employ special automatic machines of their own design to make every part of the accumulator, including grid nuts, plate bracing frames, bridges, vent plugs, lids, connectors, and containers; and each part is standardized and interchangeable.

The grids are of pure lead; the four outside edges of each being hollow grooved. Into these grooves, by machine pressure, is forced a thin stream of liquid antimonial lead, which cements the grids together and forms an acid-resisting metal frame. The lead oxide paste is riveted into and through the grid by machine pressure. As there is a natural affinity between the pure lead and the pure lead oxide paste, they readily become electrically united, and homogeneity is assured. No expanders or mechanical adulterants of any kind are used. The firm claim that the exceptional robustness of the plates permits of charge and discharge at continuous high rates, without damage of plates or danger of explosion.

The cell containers are of antimonial lead cast in one piece, and possess the merit of presenting a heat dissipating area which effectively disposes of internal heat. This permits of the use of a stronger acid solution. The metal lid is also die cast, and is designed so that it can only be put on one way. In the acid-filling aperture is fixed a specially-designed screwed vent plug which provides an effective trap against acid spraying and allows free exit for the gases.

The "Tungstone" plate requires no independent wood separator; and thus resistance in the cell is decreased and electrical efficiency thereby enhanced. The accumulator is entirely free from wood; the plates being held in position by ebonite end-spacers which do not come into contact with the active face of either side of the plate.

The accessibility of all parts of the unit is truly remarkable.

GLOVER-WEST VERTICAL RETORTS—DEVELOPMENTS IN 1927.

During the year 1927, contracts were entered into for Glover-West vertical retorts with an aggregate capacity of 26 million c.ft. of gas per day. These include the complete new gas-works for Johannesburg, which was widely commented upon in the Press on account of the satisfactory evidence it afforded of England's ability to compete with foreign manufacturers in the open markets abroad. A no less satisfactory example of successful competition is the contract for the new carbonizing installation to be erected at Rio de Janeiro, with a daily capacity of about 3½ million c.ft. In North America contracts were secured for an extension at Pawtucket (U.S.A.), and new installations at Faribault (U.S.A.), Three Rivers (Quebec), and Halifax (Nova Scotia)—the last-named after exhaustive tests on the local coals in the research plant at Manchester.

At home there are the contracts for Leamington, with a daily capacity of about 2½ millions, Derby (Litchurch Works) 3 millions, West Bromwich 1½ million, Seaford 415,000 c.ft., Pinner ½ million, Portadown 300,000 c.ft., Fraserburgh 295,000 c.ft., and extensions to existing Glover-West vertical retort installations at Bury, Southport (2½ millions daily capacity), Torquay (900,000 c.ft.), and Darlington (1 million), while the existing plant at Wishaw is being removed to the Motherwell Works, where gas-making is to be centralized.

In addition to the above a number of extensions have been undertaken in the form of replacements of retorts of the old model by retorts of the new model, with increases in capacity of from 20 to 50 p.ct. The largest of these are at Dublin, Blackpool, and Exeter. Similar extensions are being carried out, or have been carried out during 1927, at Tipton, Macclesfield, Darlington, and Uddingston; the aggregate total daily capacity of such extensions being 11 million c.ft. of gas.

The total capacity of new Glover-West vertical retorts contracted for during the year is thus 37 million c.ft. per diem.

Prof. Arthur Smithells' Lectures on Flame.

On Wednesday, Jan. 11, Prof. Arthur Smithells C.M.G., D.Sc., F.R.S., Director of the Salters' Institute of Industrial Chemistry, delivered the first part of the Dr. Mann Juvenile Lecture at the Royal Society of Arts. In elucidating the principles of flame, he told how his master, Baron Bunsen, of Heidelberg, was approached in 1883 by an Austrian scientist, Count Welsbach, who was anxious to investigate the properties of certain rare earths. It was only by accident that he noted their faculty of producing brilliant combustion; and out of it grew the mantle industry, so celebrated since. The lecturer showed how a slight admixture of cerium added whiteness and luminosity to the basis of thorium, and thus produced the intensity of light required. He illustrated the nature and limitations of the Argand and Meker burners.

Mainlaying Under Railroad, &c., Tracks.

In a note to the "American Gas Journal," Mr. C. W. Webb, of Houston, Texas, says that a plan recently adopted by the Houston Pipe Line Company, when laying a 12-in. high-pressure gas main in that town, was to encase it, when passing under railroad tracks, in 15 in. "Armco" corrugated culvert pipe, which protects the main and simplifies the location and repair of leaks. In the course of this mainlaying job, two railway tracks were encountered, on one of which traffic was particularly heavy; and for this reason it was deemed advisable to employ a method of installing the pipes which would require no work to be done on the track level. The first step consisted of making the hole, by means of a long boring device, operated from one side. Next the culvert pipe was pulled into place. Then with everything in readiness, and the remainder of the main in place in the trenches adjacent to the track, the under-track portion of the pipe was threaded through the culvert. To facilitate this threading, a "nose" was spot-welded on to it. It took only a few minutes with a torch to remove the "nose" after the pipe was through.

The Fuel Problem.—At a meeting of the Glasgow Section of the Society of Chemical Industry held last week in the Engineers' Institute, Elmbank Crescent, Glasgow—Mr. S. H. B. Langlands, Chairman of the Section, presiding—Dr. C. H. Lander, Director of Fuel Research, delivered a lecture on "The Fuel Problem." This, he said, was many-sided. The manufacturers' problem was that of deciding whether it was cheaper to use raw fuel wastefully or to use more expensive fuel economically. Recent researches along the lines of hydrogenation of coal were opening-up an enormous vista, of which no one could see the results. It was now definitely possible to make metallurgical and other cokes from non-coking coal. To do this was at present expensive, and therefore not a commercial proposition; but the mere fact that it had been done scientifically was significant.

GAS BOILERS AND THEIR APPLICATION.

From a Lecture by T. F. C. Potterton before the Staff of the Bournemouth Gas and Water Company.

The subject I propose to deal with is the general application of the gas-heated boiler, primarily for domestic purposes. However, I hope to touch upon one or two other matters.

Where the best practice is observed in the erection of pipe-work, &c., the gas-heated boiler will produce hot water for culinary and bath requirements at a cost only slightly in excess of the coke boiler; and when economy of labour, &c., is taken into account, it shows a balance in favour of gas for many types of household.

Perhaps the best plan is to fit gas boilers and small coke heaters in combined form. The boilers can be alongside, or the gas boiler may be in the kitchen and the coke boiler in an adjoining room.

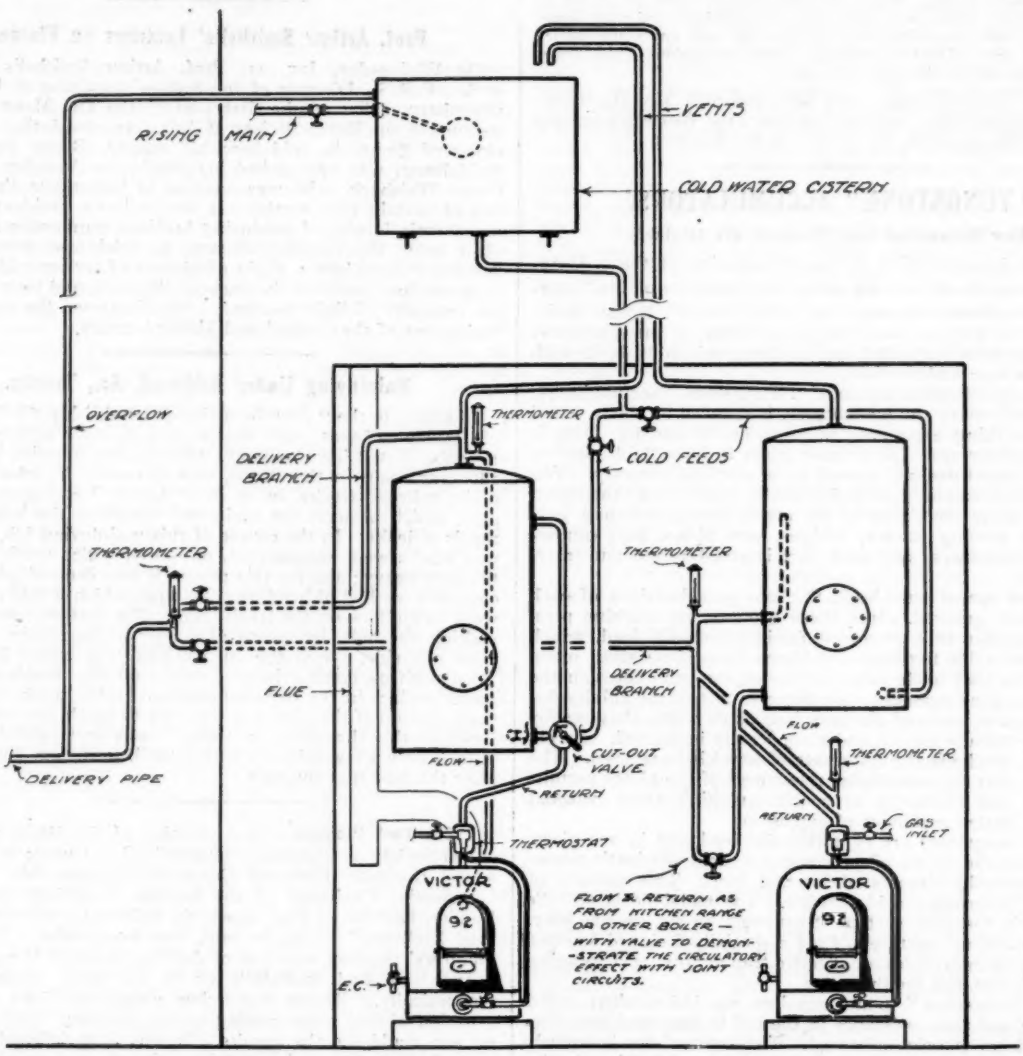
I consider this combination one of great utility, as the maid-less housewife can obtain a supply from a gas boiler constantly on cleaning days, or intermittently for culinary work and baths at other times. The arduous labour of handling solid fuel is eliminated; while a coke boiler (having an open front) as a sitting-room grate is available how and when needed, and of all the appliances for the use of solid fuel, is the easiest to work. I do not always put forward the gas boiler for exclusive use, as many cases are met where the individual requirements are such that gas as the heating agent is not perhaps the best.

The lecturer then demonstrated a "Victor" boiler, "H" Series. In this the flow pipe is connected to the top of the vessel through the vent and delivery pipe. The return is taken from the side at two levels. With the cut-out valve, either a small quantity at the top of the storage for culinary and lavatory basin draw-offs, or the full contents of the storage for the bath, can be heated. The pipes must be correctly proportioned to the rate of gas consumption. The circulating water should be at such a temperature that it answers for the sink supply, having a temperature rise of at least 80° Fahr. Anything much less than this would entail re-heating, with a great difference in gas consumption and consequent fuel cost.

All apparatus installed for hot water supply should be so designed that they heat, circulate, and store the water in such a manner that the water at the top of the storage vessel is at the highest temperature, and can be entirely withdrawn at as near as possible the highest temperature the boiler produces. It must not be lowered in temperature by mixture with cold water from any cause. This point goes hand-in-hand with proper pipe design, and cannot be too strongly emphasized.

Even when the delivery pipe is taken from the expansion pipe, the flow from the boiler may be carried into the side or bottom of the cylinder (or tank), and terminated some distance from the crown. This results in a portion of the upper part of the storage heating in bulk. Such conditions should always be avoided. When the flow pipe of a gas boiler is not properly arranged (when it is carried into the secondary flow pipe or vent pipe above the cylinder or other form of storage), the irregular connection on the storage should be capped-off, and the primary flow pipe transferred to the correct position—*i.e.*, into the secondary flow, or vent, or delivery pipe. The exception to this standard rule is where the cold water cistern happens to be situated within the same storey as the boiler, as in the case of flats. In such instances, the cistern is slightly below the ceiling, and the standard vertical cylinder system cannot then always be utilized. Reference to this is made later.

An important point is the position of the secondary return where a circuit from the cylinder is required for heating towel-rails, linen-airing coils, and so on, and perhaps to give a quick



CORRECT SYSTEM OF PIPE WORK

INCORRECT SYSTEM OF PIPE WORK

delivery of hot water at remote taps. The latter item, however, should be investigated every time, for the heat loss from constant radiation occurring with a secondary flow and return involves considerable running cost in fuel. With regard to one or two lavatory basins in bedrooms, used, possibly, once or twice daily, I often find it advantageous to serve these on single branches. Where secondary circuits are adopted, they should be coated with good-quality plastic asbestos composition, or felted and cased, as may best suit the circumstances.

The cold feed inlet from the supply cistern should always enter the cylinder horizontally, as close to the bottom as possible. Then it does not flush-out the boiler when hot water is drawn. Of course, the boiler contains the hottest water, but it is of small volume; and by carrying the feed into the boiler, the cold water would quickly follow the hot through the flow and return pipes. Any deviation from the principle recommended is fatal to efficient and economical results. When, however, a cold feed pipe enters the storage on the underside in a vertical direction, a spreader tee should be inserted. In all new work it is better to follow the former course.

One is often asked to connect a gas boiler to an apparatus heated by alternative means, such as a back-boiler of a kitchen range, or a domestic coke boiler. There should be knowledge of the fundamental conditions ruling in the working effect of either of these boilers working singly, so far as the effect is regulated by pipe connection.

The primary flow pipe enters the cylinder at the side, and has a stand-pipe internally to within 6 in. of the top. The flow and return pipes from the gas boiler are sometimes found connected with another pair of pipes into a joint flow and return to the storage. This is done for reasons of economy in erection. One cannot too strongly discount this practice. When boilers are connected into common flow and return pipes, and used alternately, a storage of low-temperature water occurs, composed of a mixture of the high-temperature water leaving the active boiler with the cool bulk of the cylinder, owing to the circulatory effect that takes place through the connections of the inactive heater. This neutralizes one of the predominant advantages obtainable by the "Victor" system of hot water supply. The use of lateral tees for the connections does not prevent the intercirculation referred to, for in all gravity systems it is the difference in the weight of the two columns of water in the flow and return pipes which causes the movement. Numerous other causes for intercirculation can be mentioned; but the case cited is sufficient to show the disadvantage of adopting joint connections.

Similarly, the effect of connecting a gas boiler into the extended flow and return of a tank system is disadvantageous. Where there is no alternative, the junction should be made as remote as possible from the existing boiler, and in any case near to the point where the vertical riser commences. With this arrangement, all supply branches must be taken from the storage side of the joint connection, in order to draw upon the heated water from either source.

When a tank system of hot water supply cannot be converted, the action of "Victor" gas boilers in supplying high-temperature water in the first circulation is of very great advantage in lessening the defect caused through the unavoidable intercirculation.

In flats and other single-storey buildings, it is necessary, where the cylinder system cannot be successfully applied, to effect a compromise between the cylinder and tank systems. If it is possible (as in the case of new buildings) to place the cold water cistern on the roof, and supply all the flats from that level, ordinary cylinder construction is recommended; but it should be noted that each flat served must have a separate cold feed, and likewise a separate expansion pipe, to prevent inter-communication between the supplies in the respective flats. Where, however, the cold water cisterns are fitted near the ceilings within the flats, it is difficult to obtain any reasonable pressure from the top of cylinders, and it is therefore necessary to have the storage in the form of a tank above the branch to the tap, in order to maintain a reasonable out-flow when drawing water. In this respect it is satisfactory; but for the purpose of gas heating where a joint arrangement with a kitchener exists, the mixture of water in heating, as well as in the process of delivery, is so marked—apart from the question of intercirculation between the boilers—that the ordinary form of tank system is unsuitable. It is therefore necessary to effect a compromise, retaining the use of the overhead storage to produce the pressure, but otherwise adopting the cylinder system (keeping the respective circulations and tap services separate).

It is first necessary to determine the largest individual demand for hot water, which invariably occurs at the bath. Having obtained the client's views as to the depth of hot water required for a satisfactory bath, note it, so that the quantity can be recognized later when filling same.

With the tank empty, the lowest bolt in the manhole cover should be removed, and into the tank a long screw inserted, having an elbow on its outer end turned upwards, and fitted with a piece of glass tube extending about 6 in. above the water-line in the cold feed cistern. The apparatus should then be re-charged, and the bath filled to the approved depth, marking the level to which the water drops within the tank as shown by the water-line in the glass tube. By this means the maximum quantity of water required is determined, and indicates the level for the draw-off branch on the tank, which should be entirely disconnected from the flow pipe of the range circuit. It is important to note that the draw-off from the tank should be not less than 1 in. bore, in order to deliver the hot water more quickly than it enters.

Having thus arranged the draw-off level, the circulation from the gas boiler should be carried direct to the storage tank, with the flow entering the side about 2 in. below the draw-off, in order to maintain a permanent circulation. The effect of this arrangement is such that the water being fed slowly into the apparatus, and running out quickly, causes the delivery to be supplied from the top of the tank, where the hottest water is stored.

For the requirements of villa residences, the complete sets, of either the rectangular or the circular type, are very useful. Their erection is economical, as they are portable, and can be brought direct from the workshop ready made up to stand in position. For houses having one bath and the usual sink and lavatory basin taps, the rectangular storage of 20, 25, or 30 gallons capacity invariably meets the case. The rectangular sets only afford great advantage in respect of the space they occupy, being 12 in. wide and from 16 in. to 20 in. deep; but they are only suitable for two-storey buildings having a maximum of (say) 30-ft. working pressure. For higher buildings, or where two or more baths have to be supplied, complete sets having cylindrical storages are recommended. These storages can be readily increased in size to almost any capacity. As a general rule, one boiler having a consumption of 80 c.ft. per hour should be allowed for every 40 to 50 gallons of water contained in the apparatus.

After the war a battery of twelve boilers was installed for one of the large drapery establishments, in a new building in Oxford Street, for work in connection with the dining-room. Since that time the apparatus has been repeated in four other cases. The volume of water contained in the storage is 400 to 500 gallons, according to the extra duty; the great advantage of the gas-heated system being its regularity of action. In London there are many public-houses equipped with dining-rooms under the new licensing conditions where a mid-day lunch only is served, and the requirement for hot water occurs between 11 o'clock in the morning and about 3 o'clock in the afternoon. The gas is lighted for this period, and is shut-off as soon as the kitchen is closed.

If we had a washing centre of eight baths, a battery of eight No. 93 "Victor" gas boilers would be considered suitable, connected to storage cylinders or tanks of (say) 300 to 400 gallons capacity—the water, of course, being heated to a higher temperature than that at which it was used in baths. This proposition provides a slight margin of storage for rush periods.

Let us now refer to hot water supply for household requirements in conjunction with central heating apparatus. This is undoubtedly a popular form of installation for the modern villa residence, because, with properly designed plant, an efficient hot water supply is assured, and—perhaps equally important—central heating is a means of reducing labour and adding to comfort.

There are two ways of dealing with this. One is to have a coke boiler of the domestic type to operate the whole of the installation—viz., the radiators as well as the domestic supply—and a gas boiler for the latter purpose only under summer conditions. The alternative scheme is to provide a more efficient type of coke boiler in the form of a heating unit, and operate the domestic hot water supply through an indirect cylinder, which latter is then heated upon the direct principle by a gas boiler for the summer hot water supply requirements.

A domestic supply boiler is not altogether the best type from which to heat radiators, because it is necessary to modify the amount of heating surface in order to obtain the necessary access for the cleaning of the waterways where lime deposits occur. It is recommended, therefore, wherever possible to provide one of the standard forms of boiler designed expressly for heating work, wherein the accessibility of the waterways for cleaning is not in demand. As a guide to the provision of heating surface for calorifier work, a safe figure to calculate upon is to provide 1 ft. of heating surface to every 2 gallons of contained water, which with a circulating temperature of 150° Fahr. will meet the demand of any ordinary household, provided the storage capacity and other factors bear the correct relation to the bath requirements.

The lecture was illustrated by a series of lantern slides and a working model of two forms of domestic supply apparatus demonstrating the quick and regular action of gas in producing hot water for various purposes.

We have to acknowledge the receipt of the "Grey Book" for 1928 of the Institute of Journalists. It includes a list of the names of the Fellows and Members of the Institute who are associated with newspapers—ordinary and technical. A register of specialized writers is supplied.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Nuneaton and the Two-Part Charge.

SIR,—I have read with interest Mr. Helps' letter of Jan. 9. I do not think he need have wasted his time on a dissertation as to what items of expenditure constitute the respective elements of the two-part charge. In advocating its advantages he is preaching to the converted, although I do not necessarily agree the arguments as to what constitutes gas costs and what constitutes service costs. He stated, for instance, that everything outside the cost of manufacture is for service and service only, and he includes distribution, management, and profit.

The distribution cost, or, at least, some of its elements, must be a function of the quantity of gas manufactured and sold apart from service. In the same way, profit, being interest on capital, must be provided in connection with the gas-works and mains.

Seeing that Mr. Helps admits that the cost of manufacture is purely a gas charge, then the interest on the capital necessary to build a gas-works must be taken into account in estimating the cost of manufacture when dealing with a two-part charge. If we deal with a three-part or four-part charge, then the production demand would cover it.

However, these are small matters; and I do not propose to reply to Mr. Helps in detail, because he has met my point in the table in the first column of his letter—viz., a consumer taking 60 therms per annum pays 7·8d. per therm with service at 9d. per week, and this would be increased to 10·4d. per therm with service at 1s. per week. Coupled with gas at 4d. per therm, this would be *equivalent* to a flat rate of 14·4d. per therm as long as the consumer did not require more than 60 therms per annum.

It is when Mr. Helps automatically multiplies his business by three in order to reduce his cost, that he and I differ. In dealing with Glasgow, Mr. Helps makes what I consider this fundamental error. He takes the same tonnage of coal; and, by virtue of producing three times as many therms per ton, he automatically creates treble the present Glasgow business, and then makes the further serious error of assuming that none of the administration and distribution charges would be increased by one penny by the increase in the business.

In his letter, he states that the Glasgow consumer taking 1000 therms per annum gets gas at 4d. per therm, and then asks whether it can be argued that the consumption would not almost immediately be multiplied by three. It *can* be argued most emphatically that the Glasgow consumer is not going to multiply his consumption of gas by three because it happens to be substantially reduced in price.

In producing gas at 4d. per therm by the operation of the two-part rate, Mr. Helps takes 1000 therms as the annual consumption, and thus he more than trebles the average. The present average consumption in Glasgow is about 140 therms; and Mr. Helps calmly multiplies it by 7 or more, in order to produce cheap gas in a two-part rate.

Mr. Helps need not be afraid that I shall miss the right road. I realize that the only thing that matters to the consumer is the annual expenditure compared with the service he gets for it. I do not propose to deal with the notes in the postscript, in which Mr. Helps casts doubt on the methods of account keeping of the undertakings published in "Field's Analysis." I have yet to meet the accountant who transfers the profit from sale of appliances to effect a reduction of cost into gasholder.

As far as I am concerned, no useful purpose is served in continuing this correspondence. When the gas industry was compelled to send out high-grade gas, Mr. Helps was hampered; and he has now had an opportunity to show what the freedom of the Gas Regulation Act can do for him in the way of cheap gas. The result is gas at 18d. per therm, or thereabouts. I hope he will shortly have an opportunity of putting into operation a two-part tariff; and then we shall be able to see what are the results at Nuneaton.

The production of coke has always worried Mr. Helps—why, I cannot understand. He can rest assured that no gas engineer is going to handle coke and other bye-products unless it produces gas at a lower net cost into holder. Mr. Helps must be aware that in many cases in the past the residual products have returned more than the cost of the coal; and even after paying sundry charges, the net cost of materials has been *nil*. No form of gasification, even with 100 p.ct. efficiency, can beat this.

The adherence of the gas industry to high-grade gas is not on account of its love of coke or high-grade gas as such, but it is the method which produces the cheapest over-all rate for the commodity it is selling.

ENGINEER.

Jan. 19, 1928.

Mr. Harald Nielsen and Thermal Calculations.

SIR,—I think that chemists in general will be prepared to admit that our knowledge of thermal data required for the treatment of such problems as relate to the carbonization and gasification of coal is sufficient to enable us to distinguish between what is possible and what is impossible. It is admitted that much of this information requires more searching critical analysis than I have been able to apply to it; and I hope that in the near future it will receive attention from the Committee the formation of which is under consideration by the Institute of Fuel. However, I had imagined that the day had gone by when technologists were prepared to state that they had abandoned the scientific method, and that, now that they "knew better," they had returned to the simpler but dangerous system of guessing, and hoping for results.

It is quite impossible to argue on such a basis; and I shall not attempt to do so. No doubt there are many who will be ready to accept as fact what Mr. Nielsen thinks "is not far wrong." I personally prefer to adopt the principle that a calculation based upon sound reasoning and upon the most carefully considered data is the safest guide, next to the result of unimpeachable experiment, and always preferable to a guess—certainly more reliable than an inventor's hopes.

I am afraid that I am not impressed by Mr. Nielsen's numerical illustrations. Further, I carefully refrained from discussing the mechanism of any process; and such questions as that of circulating gas did not come within the scope of my paper.

M. W. TRAVERS.

Chemical Department,
The University,
Bristol,
Jan. 19, 1928.

REGISTER OF PATENTS.

Water Gas Manufacture.—No. 282,141.

SYNTHETIC AMMONIA AND NITRATES, LTD., and GORDON, K., both of Billingham.

No. 22, 415; Sept. 11, 1926.

According to this invention, which is applicable to the continuous production of high-grade water gas from solid fuel and steam, carbonaceous material and steam (with or without oxygen or air) are caused to react at a high temperature maintained essentially by supplying heat to the system by conduction through externally heated walls of special alloy. For example, finely divided fuel may be passed together with steam through an externally heated vessel, the whole part of the wall of which is formed of a heat-resisting metal such as an alloy steel containing large amounts of chromium or other strengthening element or elements.

The external source of heat may be a coal or gas fired furnace. The vessel in which the production of gaseous fuel is carried out may be made of special steels such as those known under the names "Staybrite," "Era/A.T.V.," and V2A.

The external furnace is generally supplied with low-grade coal and air; and it is convenient to design it on the lines of a pulverized fuel boiler furnace, since the known manner of heating boiler tubes may be extended to the problem of heating the reaction vessels or tubes employed in the process of the present invention. As is well known, the hot furnace gases should sweep over the surfaces of the tubes at a high velocity in order to secure a high rate of heat transference; and on account of the very high temperatures employed, it may be advisable to provide baffles between the burning gases and the tubes so as to avoid the occurrence of chemical reactions at the tube surface which might deleteriously affect the material. The furnace gases will, of course, still sweep over the tubes at a high velocity; but the fuel and gases will be completely burnt before encountering the tubes.

The following examples further illustrate the method of carrying out the invention.

Example 1.

Finely divided coke of good quality (*i.e.*, low ash and volatile content) is blown together with steam through a "Staybrite" tube 30 ft. long and ½ in. diameter heated externally to about 1000° C. The gas rate in the tube is about 30 ft. per sec., giving a time of contact of about 1 sec. A slight excess of steam to coke being employed, the gas produced has the quality of high-grade water gas, containing 51 p.ct. H_2, 48 p.ct. CO, and 1 p.ct. CO_2. The gas contains no methane or other hydrocarbons.

Example 2.

Employing similar conditions to the above, but using a tube of greater cross-section and admitting a volume of air equal to that of the steam, a gas containing 42 p.ct. CO, 30 p.ct. H_2, 24 p.ct. N_2, and 4 p.ct. CO_2 may be obtained. Such a gas, after conversion of CO with steam and removal of CO_2 in the well-known manner, furnishes a gaseous mixture containing 3 vols. of H_2 to 1 vol. of N_2, which may be used for the synthetic manufacture of ammonia. When introducing air or oxygen together with the fuel and steam, it is not necessary to supply so much heat to the gasification system from the furnace. Hence tubes of greater cross-section may be employed, and the output of the apparatus increased.

To obtain the best results in processes based on the present invention, it is essential to pay due attention to: 1. The provision of sufficient heating surface to enable the endothermic reactions to draw on the external supply of heat so as to maintain favourable temperature conditions within the gasification system. 2. The main-

tenance of high gas rates, so as to promote heat transference. 3. The provision of sufficient time to enable the reactions to take place to the desired extent.

In the commercial adaptations of the preceding examples, arrangements may be made for preheating the reactants, preferably by utilizing the sensible heat of the resultant gases. It is an important feature of the invention that it enables the complete process for production of the gaseous fuel to be made continuous, as distinct from the intermittent cyclic processes generally in use.

Gas Radiators.—No. 281,053.

BROMLEY, H. H., of Farringdon Road, E.C. 1, and SHEPPARD, M., of Alexandra Park, N. 22 (legal representative of H. L. SHEPPARD, deceased).

No. 24,673; Oct. 5, 1926.

This invention is for a gas fire or radiator in which inverted mantles are used as radiants.

The radiator consists of an outer casing comprising a rear wall, two side walls, and a forwardly projecting canopy. A cover for the outer casing is made of heat-absorbing substance, and formed with vertical perforations and corrugations on its upper face. A gas-supply pipe is located within the lower part of the outer casing close to the rear wall thereof, and vertical bunsen burners extend upwards to within a suitable distance of the outer casing, then forwards either in grooves formed in the lower face of the outer cover, or, alternatively, close to the lower face of said cover, and finally downwards. A reflector extends from the top of the outer casing to a suitable part of the front of said casing; and a door is fitted to the lower part of the casing, for access to the bunsen burners. The outer casing and, if desired, the door are provided with holes for the admission of air for combustion.

Other features are described and claimed.

Grizzlies; Feed Regulation.—No. 281,899.

RUTHVEN, R. H., of Ramsgate.

No. 3502; Feb. 8, 1927.

The regulating apparatus which constitutes this invention is particularly applicable to rotary grizzlies for screening fuel which comprise two or more intermeshing rollers to which the material is fed from a trough. The screening is effected by the rotation of the rollers, and the grading of the screened material is determined by the number of pairs of intermeshing rollers and their relative adjustment.

When the material is fed too rapidly on to such a screen there is a tendency for some of the smaller stuff which ought to pass between a given pair of rollers to be carried over by the larger stuff and discharged too far forward on the screen; and it is the primary object of the present invention to prevent such "over-riding" of the finer material without reducing the rate of feeding to such an extent that the capacity of the apparatus is materially curtailed. This is effected by providing a hanging curtain or apron pivotally supported above the intermeshing rollers with its lower edge at such a height that any sudden rush of material on to the screen is retarded by the apron.

In the latter, the lower ends of depending rods or fingers, which may be pivoted to swing together or arranged in independently swinging sections, are curved towards the oncoming material so as to retard more effectively any excessive rush of material and deflect it backwardly towards the chute as it slides off the apron. Provision is made for varying the angle through which the pivoted apron can swing away under the rush of material; this angle being dependent upon the nature and size of the material which is being handled at the time, the inclination and length of the chute, and other factors.

LEGAL INTELLIGENCE.

CHALK FUEL, POWER GAS, AND BYE-PRODUCTS CORPORATION.

Charge of Conspiring to Defraud.

The proceedings were resumed on Tuesday of last week, at the Central Criminal Court, before the COMMON SERJEANT (Sir H. F. Dickens, K.C.), in the trial of Sir Charles Buckworth Herne-Soame, Bart., of Sheen Cottage, Coalbrookdale, Salop; Robert George Harley, Wake Street, Kennington; and Lieut.-Col. Edmund Octavius Eaton, of Highlands Hall, St. Leonards-on-Sea, who pleaded not guilty to an indictment charging them with having conspired together and with other persons to defraud such people as might receive prospectuses and pamphlets issued by the Chalk Fuel, Power Gas, and Bye Products Corporation, and to obtain money by false pretences from them. It was alleged by the prosecution that a conspiracy had existed among a number of persons from the very inception of the Company, to a date in 1926, to commit the offences. A report of the first day's hearing will be found on pp. 155-6 of last week's issue of the "JOURNAL."

Mr. *G. H. Franklin*, an engineer, who had given evidence for the prosecution as to tests of the fuel which he had carried out, and had stated that these tests were unsatisfactory from the point of view of maintaining a proper head of steam, said (in cross-examination by Mr. VALETTA, who appeared for the defendants) that the only people present at the tests were two engineers. He agreed that the calorific value could be increased by increasing the proportion of tar. He did not send any station superintendent's report to the Chalk Fuel Corporation for publication in a prospectus. With regard to a letter addressed to witness, signed by a Mr. Patterson (a station superintendent), this might have been handed to Mr. Hollis. Asked what led up to Mr. Patterson's making the test, witness said he thought it was a scientific test which was carried out before the laboratory test. He did not think Mr. Hollis tried to persuade him to a favourable view. The second test was an experimental advance; and, as a result of the improvement, it was suggested that the fuel should be used on a locomotive. As far as he could see, the test, from a steam-raising point of view, was successful.

Re-examined, witness said none of the tests he carried out justified the reports which had appeared in print. When he carried out his furnace test, he did not have any interview with reporters. He agreed that if there was an increase of tar in the fuel, there would be an increase of smoke.

Mr. *J. R. Belcher*, a general engineer, said that in September, 1914, he was employed on the Selsey Railway. He made a test in the company of the last witness. There was a fair amount of trouble to get up steam with the fuel. It took about 1½ hours to do the 8 miles distance; and the return journey was worse. He did not consider this chalk fuel a suitable substitute for coal to run a railway engine.

Mr. *W. McDonald Mackay*, an analytical chemist, stated that in 1914 he made a test of the patent fuel referred to. The heat value of the fuel was about three-quarters that of comparatively poor coal. With reference to a prospectus containing a report purporting to be signed by the witness, he said that they omitted to refer to the heat value in comparison with ordinary coal. He added that he had not been paid for his work.

Mr. *W. Hoskins*, Abbey Farm, Eynsham, said that in May, 1920, he received some literature from the Chalk Fuel Corporation, including a prospectus which set-out an engineer's and a chemist's report on the fuel. He decided to take some shares, and invested his money, but he could not get any dividend or reply to his letters.

The Rev. *Henry Hooke Bartram*, Rector of Newton Pragnell, said he received a prospectus and purchased shares. Later he wrote to the Company about dividends, but received no reply. He sent all the documents to New Scotland Yard. He waited five years for dividends which never materialized.

Mr. *Kenneth Harrison*, Deputy Accountant of the Cannon Street Branch of the Midland Bank, said the Chalk Fuel Corporation opened an account by a cheque for 15s., and in 1927 there was a credit balance of just over £3. The whole turn-over was about £194. The people who had power to draw on that account were one Director, one Secretary, and the Advisory Engineer—Col. Eaton's signature being necessary in every case.

Inspector *Greer* said he had dealt with the complaints received, and had paid several visits to the offices of the Company. He had a number of conversations with the defendant Harley, who informed witness that Franklin was dead.

THE DEFENCE.

STATEMENT BY THE CHAIRMAN.

Sir *Charles B. Herne-Soame*, giving evidence on his own behalf, stated that the Suddine Company was registered in 1911. He joined the Board of 1912, and became Chairman. The objects of the Chalk Fuel Corporation, of which he was Chairman, were to experiment in chalk as a substitute for coal. He was present at a test which was made by Mr. Franklin at Hammersmith; and, from expressions which were made, he thought the test was a success, though he had no technical knowledge. He received a report on the test from Mr. Hollis. The report was typewritten. The second test carried out was also in his opinion satisfactory; and in due course he received a report on it from Mr. Hollis.

COUNSEL: Have you at any time previous to the commencement of this case heard any remarks against this fuel?

Witness: No; I have never heard the slightest thing about the reports being wrong. The first hint I had was when I was served with a summons. He always had, and still held, the opinion that the fuel was a good one. He had never drawn any expenses or Directors' fees from the Company.

In cross-examination by Mr. CLARKE, witness said he was allotted shares in both Companies for becoming a Director. Col. Eaton was connected with the Chalk Fuel Corporation as Advisory Engineer, and attended the meetings of the Board. He had discussed the reports with Col. Eaton; but they had been mislaid during the war.

Mr. CLARKE: You have not got any copies of the reports which appeared in the prospectus?

Witness: No, I have not.

You would not be a party to publishing only parts of a report?—Certainly not.

In further cross-examination, witness said that he was not responsible for the production of a circular which had been sent out by the Company. It depended upon the wording of the report as to whether only part of a report was used. It was not right to issue anything calculated to mislead the public. Counsel asked who was to be the judge as to whether anything would mislead the public or not, and witness replied that he should think it would be the public themselves. He could not remember whether he was present at the meeting when the prospectus was passed. The original reports were lost during the war. He did not see any original reports himself. Counsel

pointed out that at the time these were published witness was Chairman of the Company; and he asked him whether he had had any business experience. Witness replied that it was mostly legal experience. He was a solicitor, though he had not practised for twenty years.

THE JUDGE: All the more reason why greater care should be taken.

Witness went on to say that he did not attend many of the Board meetings; and he did not know how many of the British public were cognisant of the calorific value of coal. He did not know himself. The Suddine Company was one of the vendors to the Chalk Fuel Corporation.

THE JUDGE: You, as a solicitor, must realize that when you appeal to the public you have passed the stage of experimenting?

In further cross-examination, witness said he did not think the Suddine Company ever appealed to the public. Asked whether Suddine, Ltd., paid for experiments which were made, witness said Col. Eaton lent money himself, and he could answer that question. Col. Eaton had a lot to do with the experiments. Witness was unable to say whether there were any brokers or authorized agents; nor could he say whether an Auditor was appointed, or if there was a bank account. He had been a Director of about ten other companies.

Replying to the JUDGE, who asked why he published a personal letter, witness said he took a great interest in the Company, and was of opinion that if the fuel had been put on the market it would have "boomed." He was still of that opinion, and had great faith in the fuel. Speaking generally, he said, the Company received about £1500 by issuing shares; but he was unable to say who got the money. He knew when he signed the prospectus in 1926 that the report which appeared was not dated.

The JUDGE: The reports were twelve years old. The public did not know that.

Witness: It might perhaps have been better had they been dated.

Mr. CLARKE: What was the experience of the Company which justified the hope of getting 100,000 tons per annum output?

Witness: It was the merits of the fuel itself. The Directors had every hope that the fuel would be placed on the market. He added that he had not profited out of the Company. All he had was £10 for travelling expenses. He denied having had the smallest intention of being dishonest, and had never doubted that the reports which had been issued were true reports. Documents had been sent to him from the office to sign; and he had no reason to think at the time that the copies were untrue.

EVIDENCE OF THE ACTING SECRETARY.

Robert George Harley, another of the defendants, was then called, and in reply to his Counsel said that in 1914 he was Manager of an advertising company. He met Hollis, and was keenly interested in his statements about chalk fuel. Witness joined the Board of the Chalk Fuel Corporation. At the outbreak of war he went into the army, and was demobilized in January, 1919. He then went back to the advertising agency, but later got into touch with the Chalk Fuel Corporation, and became Acting Secretary. He knew nothing about the experiments which had been made in 1914. He tested the fuel personally at his home, and was greatly interested in it. Col. Eaton, the late Mr. Walden, and himself were practically wholly responsible for the drawing-up of the prospectuses of the Company. He had not seen any of the original reports, but had no reason to doubt the genuineness of the typewritten copies.

Replying to the JUDGE, he said that, in response to an advertisement in the press, the Company received over 8000 applications from the public for samples of the fuel, which were made in briquette form, and sent out. It was upon the widespread interest, and the numerous applications which were made for samples, that the Directors based their hopes of a similar response from the public to support them in putting the fuel on the market.

Requested to produce the minute book, witness handed a book to the Judge, who remarked, upon examination of it, that it contained no record of any meeting.

Mr. CLARKE: Is that the kind of minute book that was kept?

Witness: Yes.

The JUDGE: You are playing with us, Mr. Harley, when you suggest that.

In answer to a question as to whether he considered the extract from Mr. Mackey's report which appeared in the prospectus as a fair and accurate representation of Mr. Mackey's view of the test, the defendant replied that he did not.

EATON IN THE WITNESS-BOX.

Col. EATON then entered the witness-box, and said he was a civil engineer. In 1912 he was interested in sudd grass. His attention had been previously drawn to a report of the Commissioner of the Sudan, referring to the grass which was blocking the Nile, and inviting scientists to investigate the matter. Witness agreed to test the grass. Experiments were conducted, and Suddine, Ltd., was formed; the offices being at 115, Cannon Street. The object was to act as a parent Company, and as agents for a fuel substitute for coal. Up to 1914 he had the view that the fuel was of national importance, if properly exploited. In 1921 he still held that view; and he held it at the present time. The public were appealed to for support; and he was a party to the issue of the prospectus.

COUNSEL: Have you ever had any suspicions that the reports issued were untrue reports?

Witness: No.

What work have you done as advisory engineer?—I put out a patent for the Company, and interviewed people.

The JUDGE: You took a prominent part in it?

Witness: Yes, and I intend to do so. He added that in 1921 and 1926 advertisements appeared in a daily paper offering to supply samples to anybody who cared to make a test. Since 1914 he had had only about £50 for travelling expenses.

Cross-examined, witness said he had lent the Company £500 or £600.

Mr. CLARKE: What is your occupation, except being a Director of companies?

Witness: I am an engineer He agreed that he had promoted about 18 companies. He was a Director of only one company which he formed. Several of the companies had paid dividends.

Counsel then gave the names of some companies which witness agreed had never paid any dividend.

Mr. CLARKE: There are 55 companies with which you have been associated; and only three of them have paid dividends.

Witness said he would agree. He added that after 1915 there was nothing to prevent his taking an interest in the Chalk Fuel Corporation. He was present at the Hammersmith test which was carried out by Mr. Franklin. Col. Duncan and Mr. Greenfield were present; but they had since died.

Mr. CLARKE: Whose idea was it that the test should be made?

Witness: Mr. Hollis made the suggestion.

And were you altering the composition of the fuel all the time?—Yes.

Why did you not ask Mr. Hollis for the original report?—I was satisfied with the copy.

The JUDGE: Is that the only answer you can give?

Witness: Yes. He agreed that he never saw any of the original reports of Mr. Franklin.

The JUDGE: This is astonishing—that you or the Chairman of the Company never saw the original reports.

Referring to the partial exclusion of Mr. Mackey's report from the prospectus, witness said he did not agree that the statement of Mr. Mackey was a fair one. He did not consider it fair to say that coal was as low as 8000 B.Th.U. per pound.

The JUDGE: Was that sentence of Mr. Mackey's deliberately omitted because you did not agree with it?

Witness: I did not know that the last sentence of Mr. Mackey's report had been omitted from the prospectus.

Mr. CLARKE: Who is responsible for this prospectus?

Witness: I am not entirely responsible; but I am willing to take my share of the responsibility. He went on to say that he knew the locomotive test was to be made; but he was not present at the test. He had never heard that the test was unsatisfactory until he appeared at the Mansion House Police Court.

Mr. CLARKE: Do you suggest that Mr. Franklin never made the report which appeared in the prospectus?

Witness said it was a copy of the report which he had seen. He added that he still held the view that if the fuel was put on the market, 100,000 tons would be disposed of in six months.

Mr. CLARKE: If the public had believed all these stories about this fuel, and that the reports were correct, they would have subscribed in larger numbers?

Witness: No.

It was to influence the public to buy shares, was it not?—Yes. He added that they had carried out a large number of experiments which went to prove that the fuel was valuable to gas manufacturers.

Sir *W. Foster* was called, and said he was a retired colonel, and that in 1914 he was interested in the fuel, in the sense that it was brought to his notice by the way of circulars. He was present at a test at Hammersmith, which was conducted by Mr. Franklin. There were about a dozen persons there. He did not hear any remarks passed by Mr. Franklin about the fuel being unsatisfactory. He added that he put money into the Suddine Company, and attended a further test of the fuel at Bow. Remarks were then passed about the wonderful way in which the fuel burned.

Cross-examined by Mr. CLARKE, witness could not say who invited him to attend the test at Hammersmith.

Mr. VALETTA then addressed the Jury on behalf of the defendants, and urged them not to take the view that Col. Eaton was a plundering company promoter. "I want you to believe," said Counsel, "that he genuinely, honestly, and sincerely believed that this chalk fuel had a future before it. He has put his time and money into this concern; and he is hundreds of pounds out of pocket." Counsel went on to say that Sir Charles Herne-Soame might be to blame for staying in Shropshire. He might have failed in his duties; but did he, knowing that Mr. Franklin's report was something other than the copy sent to him, say that their heads should be put together to get a few hundred pounds out of the public? Counsel submitted that he did not. The case to a large extent depended upon the recollection of Mr. Franklin, whose evidence, he submitted, should not be relied upon. Counsel dealt in detail with the tests which were carried out at Hammersmith and Bow, of which very good reports were made by Mr. Franklin. The locomotive test was, perhaps, a failure; but Mr. Franklin made a gloomy report of it. The accused men had never seen the original reports. They had only received typewritten copies. "I wonder," said Counsel, "if Hollis had been alive, whether Mr. Franklin would have gone into the box and given evidence."

Mr. CLARKE, for the prosecution, said that the issue of the prospectus brought in over £1000; and there was nothing to show what had become of the money. The printers who prepared the prospectuses and circulars had not received payment. It was due to the shortage of coal that an opportunity was afforded the defendants to place the chalk fuel on the market; but it was not a success. No books of any kind had been kept; and a banking account which covered a period of about a year had only £150 through it. What became of the money? When the trouble in the coal trade began again in 1926, a further prospectus was sent out by the Chalk Fuel Corporation, and the reports on the fuel were not dated. These reports were twelve years old. Were the dates left out accidentally? Would the public realize, when they read the report of the test on a locomotive, that it was so old? With regard to Colonel Eaton, he was introduced to the Court as a consulting engineer to many companies. He was the promoter of at least fifty companies, of which only three had paid dividends. Surely he had enough experience of company promoting to know that proper books should be kept. His was the guiding hand behind the scene; and now he said he never saw the original reports of Mr. Franklin. The Jury had to consider who had authorized the publication of the prospectuses. Two of

the Directors were responsible—Sir C. Herne-Soame and Mr. Harley—while Colonel Eaton was a party to it by reason of the fact that it was his hand which drafted some of the reports that were issued.

VERDICT OF GUILTY.

After the luncheon adjournment on Friday—the fifth day of the trial—the Jury returned a verdict of guilty against all three defendants.

Mr. CLARKE said that, with regard to Sir Charles Herne-Soame, everybody must feel sympathy with him to a certain extent. He was still a member of an honourable profession; but he had fallen upon hard times. He was 64 years of age, and had lived with his daughter-in-law and his son in Shropshire. His income was quite small; and the temptation to him to join the Company was great. He was adjudicated bankrupt in 1897; his liabilities being £345, and his assets £62. He was not then a baronet. When his father died, he made provision in his will that creditors should be paid to the extent of 10s. in the pound, and defendant obtained his discharge in respect of that bankruptcy. In 1911 he was again adjudicated a bankrupt; his liabilities being £176, while the assets were only a few books valued at £6. Defendant was afterwards a Director of various companies, and had been associated with Eaton, who it was suggested was a promoter of bogus companies. Sir Charles then promised that he would have nothing to do with Eaton and his companies; but unfortunately he did not keep that promise. For the last twenty years defendant had allowed his title to be used as a sort of bait in connection with doubtful companies. With regard to Harley, although he had been associated with Eaton in the matter, he was, in the opinion of the prosecution, very largely acting under instructions from Eaton. He took a subordinate part in the frauds. He was a dummy Director, never daring to question orders which were given him. Edward Warden was one of the Directors of the Company against whom proceedings were taken. After the summons was served, he was found addressing envelopes for a few shillings a week; and he met his death by putting his head into a gas oven. Eaton was regarded as a real danger.

A NOTORIOUS SHADY COMPANY PROMOTER.

Detective Inspector *Greer* was called, and said that Eaton was 63 years of age, and for the past twenty years had resided at various addresses in Hastings and St. Leonards. Most of his transactions in that district were usually carried through in his wife's name; and he was considered there to be a man of bad principle. For a quarter of a century Eaton had been promoting companies, the great majority of which had been of a very doubtful character; and very few (if any) dividends had been paid. Although Eaton had been the principal and prime mover in these companies, he had rarely, if ever, allowed his name to be used on the Board of Directors. There was no doubt that, while the operations of those companies had been clothed with certain legality, very few were commercially sound. It could be said that Eaton had been mainly responsible for the taking over or promotion of over fifty companies, and that he had gathered a number of men around him whose names were shown as Directors—including the defendants Harley and Sir Charles Herne-Soame—who were at his command, and obeyed his instructions. Carefully-worded circulars and prospectuses were compiled; and these were issued to the public after Eaton had passed them. He controlled the finances; and no cheque could be paid without his authority. For a number of years Eaton had turned his attention to gas and other public utility companies, which sounded solid and important. Since 1921, 23 of those promotions and their dummy Directors had been traced; and seven of them would be, or were, compulsorily wound-up. The remaining concerns were in a parlous condition, and without funds. In a few exceptional cases a small gross revenue was being made, enabling the payment of a few clerks and office accommodation.

Eaton had been notorious for many years as a shady company promoter. In general his methods had been to buy up or promote small public companies, and having issued a large part of their nominal capital to himself for a fictitious consideration, to unload the capital on the public by flooding the country with documents described as "Offers for sale of shares and debentures." In many instances the companies had no real substance or trading prospects. Others, which had assets and some little business, were grossly over-capitalized, until their shares had no dividend or even break-up value. While Eaton sold his "promoter's shares" in the manner referred to, he also obtained, by means of the same or similar documents, subscriptions for the unissued capital of those companies. Some portions of the subscriptions were used to keep the companies alive for as long as they could serve his purpose; but in the main Eaton also converted those monies to his own use, or to the furtherance of his schemes by charging extravagantly for preliminary expenses, public issue costs, and other work which he purported to carry out. When, by reason of attacks in the Press, and absence of dividends, the public could no longer be induced to buy or subscribe capital, those companies, denuded of funds, became useless to Eaton, and remained dormant or were liquidated. There was no question of mismanaged finance or reckless trading.

So far as was known, every company with which Eaton was connected bore evidence of a deliberate scheme to exploit the company and the public for his benefit. He operated the transactions of the public companies through private companies in which his nominees were shareholders; while the officials of all his concerns were employees, out-of-elbow clerks, and dummies who carried out his instructions in exchange for small cheques for fees and expenses. The prospectuses issued by him contained promises, half-truths, and puffs. Rarely did there appear any definite misstatement of fact, although when read as a whole the material omissions clearly showed that they were prepared with intent to deceive. Prospectuses had been issued in batches of 100,000 to 200,000 at a time, from offices situated in London, Birmingham, Bournemouth, and elsewhere, to addresses taken from lists of investors in companies filed at Somerset House, or purchased from circularizing agencies—discrimination being shown by Eaton's written instructions, such as "Send to women only." The prospectuses usually caught persons possessing little business knowledge, and who had no means to take legal remedies. Should active measures be taken, however, Eaton removed the disgruntled shareholder by re-purchasing his shares at a discount, and re-selling them at a profit on a fresh "offer for sale" or "prospectus." Accounts were rarely issued. Sometimes pressure would produce a balance-sheet; but it would invariably be misleading or false. Shareholders' meetings were seldom held, or, if held, were packed by nominees, and took place at times inconvenient to the general public. Official and other investigations were hampered and delayed by the companies' lack of books, accounts, and statutory returns; while over all transactions a fog of deliberate irregularities was rendered more difficult to disperse by the inaccurate work of Eaton's employees. In short, Eaton had for many years successfully conducted an organization for promoting unstable companies, and hawking worthless shares by every trick known to the unscrupulous and fraudulent company promoter. Many pitiful letters from persons all over the country in respect of money they had invested in one or other of Eaton's companies had been received by the bankruptcy authorities and the police. Some were from old people who relied on money coming from invested stock for their subsistence; and others were from persons who had invested their life savings. In 1912, a small booklet was issued by Eaton and his associates, headed "Interesting particulars relating to the remarkable discovery of gas and petroleum in the South of England," by a Company known as the South of England Natural Gas and Petroleum Company, Ltd. On the inside page, under the word Chairman, were the following names, among others: Admiral Lord Fisher, Rt. Hon. George Lambert, M.P., Sir Boverton Redwood, Bart., Sir Philip Watts, K.C.B., F.R.S., and Engineer Vice-Admiral Sir Henry John Crane. In very small type under the last name was printed: "The above gentlemen represent the Royal Commission appointed to inquire into the fuel supply of the British Navy."

The JUDGE (looking at the booklet) remarked: That is very ingenious.

Inspector *Greer* went on to say that complaints were received from persons who had been induced to invest money in that concern, as they thought the gentlemen whose names were shown were connected with the Company, whereas they had nothing to do with it. The matter was brought to the notice of the Director of Public Prosecutions; but owing to certain difficulties, it was decided to prosecute Eaton and the printers, and he was fined £27 6s. at Tower Bridge Police Court in January, 1913, in respect of the printers' imprint not being on the document. On April 18, 1902, Eaton was appointed to a Commission as second lieutenant, 2nd Cinque Ports Royal Garrison Artillery Volunteers. He resigned his Commission on May 26, 1906. On Dec. 1, 1914, he was appointed to a Commission as Major, Territorial Force Reserve General List; and on June 1, 1915, he was transferred to the 10th Batt. Middlesex Regiment, in the rank of Major, and appointed temporary Lieut.-Col. He was called upon to resign his Commission on Dec. 19, 1915. He had in the latter regiment with him Lieut. H. Hollis, who was sued at Hayward's Heath County Court about October, 1915, for £17 for the hire of a motor car. In his defence, Hollis said that his commanding officer, Colonel Eaton, formerly his employer in business, was responsible, and he, Hollis, signed orders on his instructions. In April, 1925, an inquiry was held at Leamington regarding the competing claims of the Barford Electric Supply Company, Ltd., one of Eaton's companies, and another company, regarding an application for an Order to supply electric power to a number of villages in South Warwickshire. The inquiry was conducted by an Inspector of the Ministry of Transport. One of Eaton's associates represented Eaton's company at the inquiry, and Eaton was referred to there as a super-crook.

EATON SENTENCED TO PENAL SERVITUDE.

The JUDGE then addressed the accused men, saying: "I entirely agree with the verdict of the Jury. To my mind, the evidence was overwhelming. You all had a fair trial; and you have been admirably defended. The Jury have taken the view, with which I agree, that you were guilty of these attempts to defraud and deceive the public; but I must discriminate between you. There is no doubt who is the originator of this, and that is Eaton. He has lived for years as a fraudulent company promoter. He has carried on a profession of a public plunderer—a most serious danger to the community. I regard this as a very serious case." He sentenced Eaton to four years' penal servitude.

Addressing Sir Charles Herne-Soame, he remarked: "I greatly regret your position; but I am perfectly confident that what has been said by Mr. Percival Clarke was absolutely right. Unfortunately, you were in low water; and you allowed your name to be used by Eaton without thinking that what you were doing was against the public interest. Yours is a very, very different case from Eaton's. You were a dummy under him. In fact, you were the 'guinea-pig.' I want to be as light as I can, because I know the temptation was great; and I wish with all my heart I could pass it over altogether, but I cannot. People must be taught that they must not allow their titles to be used for extorting money from the public." Sentence of six months' imprisonment in the second division was passed on him.

A similar sentence was passed on Harley; the Judge saying: "You were under the thumb of Eaton; and you did what you were told. There again, yours is a very different position, because the whole thing was dominated by Eaton."

Boiler Patent Dispute.

Mr. Justice Tomlin, in the Chancery Division on Jan. 20, reserved judgment in the action by Jones & Attwood, Ltd., of Stourbridge, against the National Radiator Company, Ltd., of Hull, for an injunction restraining the alleged infringement of their registered design for domestic boilers known as the "Armchair" boilers. The defendant Company, while denying infringement, alleged that the design was invalid on the ground that it was too ambiguous.

MISCELLANEOUS NEWS.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.

Chairman's Address at the Annual Meeting.

The Annual Meeting of proprietors of the Aldershot Gas, Water, and District Lighting Company was held to-day (Jan. 25)—Mr. R. W. EDWARDS, Chairman and Managing Director, presiding.

The SECRETARY (Mr. F. A. Ricketts) having read the notice convening the meeting,

The CHAIRMAN said: The twelve months of 1927 have been, to some extent, a period of recovery from the unfortunate general strike in 1926, when this Company, like many others, spent large sums of money in purchasing coal from various countries in the world. I need only repeat here that the services rendered by our employees were of such an outstanding nature that they will long remain fresh in our memory.

GAS.

The expansion of our gas department continues on satisfactory lines. During the twelve months, 1779 pieces of apparatus have been fixed for the various consumers, as against 1748 pieces in 1926. When you consider that in the latter year there was an unprecedented rush for apparatus, because of the strike, you will agree that 1927 compares very favourably. The increased sale of gas for the year was 2¼ p.ct., as compared with 7·7 p.ct. for 1926. Here, again, the result, having regard to the heavy demands for gas in 1926, is fairly satisfactory; but we had a sunless and cold summer, which doubtless kept the coal fires burning at the expense of the gas cooker. Coke and sulphate of ammonia slumped; tar was a little better. The amount received from residuals represented 56·6 p.ct. of the cost of coal, as compared with 66·8 p.ct. in the strike year (1926), and 46·1 p.ct. in 1925. The large proportion of our reconstruction programme is drawing to a close. A later portion, which will embrace one of our retort houses and three gasholders, will of necessity be left over for some two or three years. The price of gas has been reduced during the year by 1·8d. per therm = 9·45d. per 1000 c.ft.

WATER.

This department has again progressed steadily. During the severe wintry spell, the consumption of water per head of the population was excessive, and reached a maximum of 34·8 gallons in one day, as compared with an average consumption for the year 1927 of 15·79 gallons—which is a very creditable achievement on the part of our energetic inspectors. The inspectors are applying themselves assiduously to supervising the repairs to pipes which were damaged through frost; and it is hoped that our net consumption per head, for domestic purposes, will soon be restored to the normal. The summer was a very poor one; and, in fact, the whole year was extraordinarily wet. The total rainfall was 37·34 in., and second only to the highest (1903, 40·91 in.) in a hundred years.

ELECTRICITY.

This department records a net increase in the sales for 1927, apart from special contracts, of 19·6 p.ct., as compared with 21·7 p.ct. in 1926. The output of electricity is satisfactory, and during the year we extended our Farnborough generating station; but future supplies will doubtless be through the Central Electricity Board. We have added 3554 lamps (as compared with 3310 in 1926) and the following apparatus:

	1927.		1926.
Motors	9	..	13
Fires	50	..	20
Cooking apparatus	14	..	6
Sweepers	34	..	17
Irons	23	..	—
Miscellaneous	17	..	—

We have decreased the price for lighting by two quarterly reductions of ¼d. per unit, and by three quarterly reductions of ¼d. per unit (with a further concession of ¼d. per unit operating from Lady Day, 1928) for all other purposes; while from the latter, where separately metered, substantial discounts are allowed for day consumptions. The policy with regard to this department is one of active development; and we are working on lines acceptable to, and in co-operation with, the Central Electricity Board and the Electricity Commissioners. We anticipate that in a very few years it will rank in profit-earning capacity with our premier department.

CAPITAL.

Following my previous practice, I now deal with a statement as to our capital: For the three undertakings, the amount of capital authorized is £1,056,367 14s. 2d. Of this there has been received £822,565 12s. 5d. Adding a debit balance of £68,592 11s. 8d., we arrive at a total of £891,158 4s. 1d., from which £40,989 8s. 3d. (having been added on consolidation in 1909) is deducted to arrive at a net figure of £850,168 15s. 10d. After deducting depreciation of £7991 19s. 3d., the net expenditure for the year 1927 was £89,078 5s. 10d., and of this latter sum there has been spent on the following departments:

Gas	71·7 p.ct.
Water	2·1 ,,
Electricity	26·2 ,,

Or, again, further analyzing the expenditure under the heads of the various works:

Lands, new buildings, and works	62·4 p.ct.
New mains and services	20·9 ,,
New meters	4 6 ,,
Machinery	11·5 ,,
Transformers	0·6 ,,

GENERAL.

We have added a total number of all consumers for the year of 1670, making 4940 in four years. A new showroom has been opened at North Farnborough; and we have a site at the "Bird-Cage," Central Farnborough, for another. Also, we have purchased land at Fleet for a new showroom. As circumstances justify, it is our policy to develop our sales department (under Mr. Wheble, its energetic Manager) by opening showrooms in suitable localities, to enable the public to obtain the best service and to inspect the latest apparatus for gas, water, and electricity.

The Directors pay tribute to the three principal officers—the Chief Engineer, the Chief Accountant, and the Secretary—and to all officials and employees in their respective departments. The co-partnership benefits were somewhat affected by the revision of the standard price (which regulates the bonus machinery). The Sports Club and benevolent and hospital funds (in collaboration with convalescent homes) have done good work during the year, respectively for the recreation of the various employees and the relief of those who have been sick or injured.

A very important programme lies in front of your Directors; but I do not think it is necessary for me to unfold it prematurely in public. So I will now draw my address to a conclusion; and, in moving the resolution for the adoption of the report and accounts, I would invite my colleague, the Deputy-Chairman (Mr. Thomas A. Braddock) to second the same.

INQUIRY AT CLITHEROE.

A Ministry of Health inquiry at Clitheroe into the Corporation's application for power to borrow £60,000 for gas-works improvements was conducted on Jan. 18.

The DEPUTY-TOWN CLERK said the scheme for extension and improvements had been under consideration for a considerable time, and unless the work was started soon, money would be wasted on repairs.

Mr. *A. R. Bleazard* said the outstanding loans of the gas-works amounted to £33,772, against which there was a sinking fund of £18,415. The amount borrowed on the works was £56,048, towards which £22,276 had been repaid. The sum of £967 had already been spent on the gas sidings, for which application for borrowing powers was being made.

The INSPECTOR: You did this work before you informed the Minister?—Yes.

The INSPECTOR: I hope you are aware that any money spent before the Ministry's sanction is at the Council's own risk?—Yes.

Mr. *R. Barrett* (Gas Manager) said the improvements would save £1500 a year in cost of production. There was no doubt about their ability to meet the extra cost due to the expenditure on the undertaking without transferring it to the consumer. The cost of coal would be reduced by one-twelfth, and the number of employees from 60 to 30.

The Inspector was informed that tenders had been accepted subject to the consent of the Ministry. Tenders were sought from selected firms, and all the material used would be of British manufacture. The profits had varied between £46,800 in 1923, and a loss of £102 in 1927. With the exception of £2500 devoted to relief of rates, the consumers had the full benefit of all the profits during the last fifty years.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referee's Reports of the official testings for the past quarter give the following average calorific values for the gas supplied by the Metropolitan Companies named:

Commercial Gas Company.—503·3 B.Th.U. (declared calorific value, 500 B.Th.U.).

Gas Light and Coke Company.—502 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—562 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—501·8 B.Th.U. (declared calorific value, 500 B.Th.U.).

Tottenham District Light, Heat, and Power Company.—505·2 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—473·9 B.Th.U. (declared calorific value, 470 B.Th.U.).

The boiler house chimney was blown down at the New Mills Gas-Works during the recent gale. A man named Hannon had a very narrow escape; a bucket he was carrying being knocked from his hand.

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PATENT WASTE HEAT BOILERS
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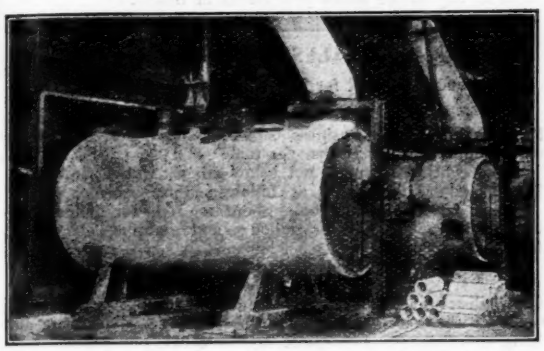

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GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDERS.

Maryport Urban District Council.

To authorize the purchase of additional lands, and to confer general powers upon the Council in regard to the gas undertaking.

Southend-on-Sea and District Gas Company.

To make provision as to prices for gas in certain districts, and to enlarge the powers of the Company with regard to the supply of gas.

AMENDING ORDER.

Berkhampstead Gas Company.

On an application by the Company, under section 1 of the Gas Regulation Act, for an Amending Order revising the powers of charging for gas supplied authorized by the Berkhampstead Gas (Charges) Order, 1921, the Board of Trade have determined that, as from Jan. 12, section 3 (standard price) of that Order shall be read and have effect as if the word "fourteen" were substituted therein for the word "eighteen."

MESSAGES FOR THE NEW YEAR.

The magazines for January of the two largest of the London Gas Companies contain the following messages to co-partners for the New Year.

THE GOVERNOR OF THE GAS LIGHT AND COKE COMPANY.

The year that has just ended began with the cloud of the coal stoppage still hanging over us. That is fortunately a thing of the past; and to-day our chief object is to give a full and satisfactory supply of gas in the wild wintry weather which we are now experiencing.

During the year the Company has prospered; and the price of gas has come down from 11·6d. per therm to 8·6d., equal to the lowest price since the war. This is a matter of great pleasure to the Directors, and I am sure to all co-partners, as it is everyone's desire that the Company shall sell gas as cheaply as possible.

If I may refer to a personal matter, I should like to say how deeply touched I was by the general expression of pleasure at the honour bestowed on me last January by H.M. the King. It was a great encouragement to me in my work to feel that I had the good wishes of you all. I also very much appreciate your kind thought in asking me to sit to Sir William Orpen for my portrait.

D. MILNE-WATSON.

THE PRESIDENT OF THE SOUTH METROPOLITAN GAS COMPANY.

After thirty-seven years since the inception of our own co-partnership, there are to-day signs that the industrial world is beginning to awaken to the possibilities of co-partnership and take a view of it from the standpoint that we have occupied for so long and—it can truthfully be said—so lonely a time.

In that period, practically every form of strike, general or particular, lightning or deliberate, wholesale or in detail, has been launched upon the whole community, or certain sections of it, with the object of enforcing better conditions of work or wages. Millions have been spent in carrying on industrial warfare, but comparatively little upon intelligent encouragement of industrial peace. It is a good sign, therefore, when a leading public man—one, too, who has the confidence of many of his fellows—lays down the dictum that "next to one's wife one should love one's work." I believe that in the great majority of workers such a feeling is instinctive, and that we all experience a certain satisfaction in having done well something to which we have laid our hands.

If co-partnership can encourage or help this satisfaction to express itself—and I believe it does—much will have been achieved in the direction of making our lot in life a happier one. For two things are certain. In all classes of society the great majority have to work; the idlers we read so much about being the exception, and not the rule. The other certainty is that we want to live happily. If we were given the choice of two gifts, riches or happiness, would we hesitate in making a decision, unless we were labouring under the delusion that the two went hand in hand? We can at least say for co-partnership that it has smoothed the rough edges of life with many thousands of co-partners; and in gilding, however lightly, their hours of toil, it has brightened by reflected rays the time allotted to home life and recreation.

Year by year it is the aim of the management of this Company to improve its methods of manufacture, both in regard to gas and bye-products; and it is only by such improvements that we can hope to hold our own in a daily increasing competition with other sources of light, heat, and power. We cannot hope to achieve the full measure of success either in maintaining or increasing employment, unless we have the willing co-operation and the best help from each one of our employees in our fight to secure for gas a fair field and no favours.

And year by year it can be said with truth that we have done something to ensure healthier, and therefore happier, lives for our employees; for we all know that frail bodies are not the best caskets to hold strong minds.

CHARLES CARPENTER.

A promise of a reduction of 5d. per 1000 c.ft. in the price of gas at Leeds in April was given by Councillor E. J. Clarke, Chairman of the Leeds Corporation Gas Committee, in an address at Kirkstall recently. He said that though there had been a loss on the gas undertaking of £30,000 owing to effects of the 1926 coal strike and accumulated from previous coal disputes, the Department had overcome that loss, and in March would be able to show a clean ledger.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market during the past week has been brighter than for some time, and practically all round there has been a firmer tendency. No particular reason is apparent, but merchants seem to have been covering their sales, and the extra demand has made itself felt. Colliery turns are now quite good until well into next month; but there is no improvement in the demand for positions further ahead.

Durham coking coals have remained in good request for export, and gas coals, especially the better qualities, are being well taken. Wear Specials quote 16s., and best qualities 15s. 6d., while seconds are nominally 13s. 6d. to 14s. Durham unscreened coking is called 14s. to 14s. 6d. Best Durham unscreened steam for bunkers or cargo is firm at 14s. 9d. to 15s. 9d., according to place of shipment. Seconds are plentiful at nominally 13s. 6d. to 13s. 9d. Northumberland steams are quoted at 13s. 9d. to 14s. for best screened qualities. Gas coke remains well held, and is quoted at 23s. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

It appears likely that gas concerns will buy their fuels earlier in the future than they have done during the past few years. Tentative inquiries are already emanating from some sources for tonnages to commence in June or July next. Probably this is the outcome of anticipations in regard to unity among the collieries under their latest scheme.

The industrial market has no particular feature. The recent increases for washed fuels have been maintained, although in a few instances with difficulty.

There is no improvement of any moment in the export section, and evidently there will have to be a serious drop in prices before any impression is made on the foreign market.

The demand for house coal continues fairly weak for the time of the year, and the coal trade is probably now feeling the full effect of the last strike. The absence of severe weather encourages householders in the use of gas stoves and electric radiators, so that the consumption of coal is reduced accordingly. Prices are fairly steady, with indications of slight reductions in some quarters.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 15s. 9d. to 16s.; screened gas coal, 16s. to 16s. 6d.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 6d. to 15s. 9d.; washed singles, 15s. 3d. to 15s. 9d.; washed smalls, 11s. 9d. to 12s.; smithy peas, 17s. to 18s. 3d. per ton.

West Yorkshire—Hartley's (f.o.b. Goole), 14s. 6d. to 15s. 6d.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 6d. to 15s. 9d.; washed singles, 15s. to 15s. 6d.; washed smalls, 11s. 6d. to 11s. 9d.; unwashed trebles, 15s. to 15s. 3d.; unwashed doubles, 11s. 6d. to 12s. 6d.; rough slack, 9s. 6d. to 10s.; coking smalls, 9s. 6d. to 10s, per ton.

Derbyshire and Nottinghamshire—Top hards, 16s. 3d. to 17s. 3d.; washed doubles, 15s. 6d. to 15s. 9d.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 11s. 6d. to 12s.; rough slack, 9s. 9d. to 10s. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s.; gas coke, 24s. to 25s. 6d.; furnace coke, 17s. 6d. to 18s. per ton.

In Lancashire, the industrial fuel trade is unsatisfactory owing to short time at the cotton mills. House coal is in slow demand. Quotations are: Lancashire best house, 31s. to 32s.; seconds, 28s. to 29s.; common, 19s. to 21s.; kitchen, 23s. to 25s.; Yorkshire selected house, 31s. to 34s.; house, 27s. to 28s.; cobbles, 17s. to 20s.; washed doubles, 12s. to 14s.; washed singles, 11s. to 12s. in wagons at the pit.

MIDLANDS.

Market conditions have become slacker. Not only has the slight fillip given to the house coal trade by severe weather faded out, but supplies are being offered at prices lower than those which prevailed in the dead season last year. The patent fact is that a market which has shrunk through the displacement of solid fuel by rival heating agents is over-gorged with supplies.

Pits are working from three to five days a week. Home industries are no more absorptive than formerly; on the contrary, the heavy industries are consuming less than they consumed before Christmas. In the circumstances, more effective steps for consorted limitation of output are considered almost inevitable even by those to whom the main principles of the scheme outlined for Yorkshire, Derbyshire, and Nottinghamshire are unacceptable.

Negotiations have been opened in a few cases with a view to contracts for gas coal over the year from midsummer onwards. It is reported that supplies have been arranged for at prices below those which are now being paid. Meanwhile deliveries are being taken regularly against current contracts, and there is no difficulty for undertakings that require supplementary consignments getting what they want at short notice and on easy terms.

The flatness of the market may be judged from the following quotations at the pithead: Slacks, 6s. to 8s.; beans, 8s. to 9s. 6d.; D.S. nuts, 9s. to 11s., extending to 15s. or 16s. for special qualities; blast-furnace coke, 11s. 6d. upwards at the ovens.

CONTRACTS OPEN.

Coal.

The Gas-Works Committee of the County Borough of Oldham invite tenders for the supply of screened coal and washed nuts. [See advert. on p. 216.]

Retorts.

The Loughborough Corporation Gas Department invite tenders for the renewal of retorts. [See advert. on p. 216.]

DIARIES, CALENDARS, &c.

From the Co-partnership Committee of the Gas Light and Coke Company, we have received the Co-partners' Calendar for 1928. It is a useful production. In addition to a small date block, it gives the names of the members of the Court of Directors, and of the chief officers, together with the representatives of all the stations and departments who constitute the Co-partnership Committee, under the Chairmanship of the Governor (Sir David Milne-Watson), and Deputy Chairmanship of the Deputy-Governor (Mr. Henry Woodall, M.Inst.C.E.). From other particulars we learn that the Company's district has an area of 265 square miles, the gas manufacturing stations number 13, the district offices and showrooms 36, and the consumers 1,250,000. The Company have 20,000 employees, of whom 15,500 are co-partners. The amount of stock held by the co-partners is £720,000.

From Messrs. Mobberley & Perry, Ltd., the well-known gas retort, fire clay, and brick manufacturers, of Stourbridge, we have again received an excellent desk blotting pad, with, at the side, a diary in book form for memoranda purposes.

We have received from the Portland Cement Selling and Distributing Company, Ltd., 27, Buckingham Gate, London, S.W. 1, a copy of their Red Triangle Diary for 1928. It contains a large amount of data, of considerable value to architects, surveyors, structural engineers, borough engineers, builders, and contractors. We are informed by the Editor that he will gladly send a copy to any applicant engaged in any of the above professions or trades.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 23.

There is hardly any business being done in pitch, and the price is quite nominal at about 85s. per ton.

Creosote continues firm at not below 9d. per gallon f.o.b.

Tar spirits are unchanged as follows: Pure benzole, 1s. 5d. to 1s. 6d. per gallon; pure toluole, about 1s. 10d. per gallon; 95/160 solvent naphtha, 1s. 3d. per gallon; and pyridine, about 6s. per gallon.

Tar Products in the Provinces.

Jan. 23.

Tar products markets generally are dull.

In pitch, there is little or no business doing. Consumers appear to have covered their immediate requirements, and producers show no anxiety to sell.

Creosote oil is still firm, and the demand both for export and home trade continues.

Water-white products are still neglected.

Naphthalene remains steady, but there is little or no business doing.

Crude carbolic acid is still very firm, and makers are holding for better prices.

Cresylic acid is steady, and there is still a good demand for the better grades.

The average prices of gas-works products during the week were: Gas-works tar, 55s. 9d. to 60s. 9d. Pitch—East Coast, 75s. to 77s. 6d. f.o.b. West Coast: Manchester, 70s. to 72s. 6d.; Liverpool, 72s. 6d. to 75s.; Clyde, 73s. to 76s. 6d. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10¼d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 9d. to 9¼d. Heavy naphtha, North, 8¾d. to 9¼d. Creosote, in bulk, North, liquid, 7¼d. to 7⅝d.; salty, 7⅜d. to 7¼d.; Scotland, 7¼d. to 7⅜d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2¾d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Gas Storage at Dundee.

The Dundee Gas Manager, Mr. James Dickson, has issued a report to the members of the Gas Committee containing proposals for increasing the gas storage capacity. Mr. Dickson makes the following suggestions: (1) Additional compressing plant is immediately necessary; (2) a new high-pressure main to Perrie Street, Lochee, should be laid in stages over the next two or three years; (3) additional gas storage to the extent of one million c.ft. should be provided at Lochee within the next two or three years. Further requirements in storage accommodation should be met as follows: (1) The erection of a holder of 1 million c.ft. capacity at Broughty Ferry, displacing two 45,000 c.ft. holders which serve no effective purpose on account of the low pressure thrown by them; (2) the erection of a holder of 500,000 c.ft. capacity at Perrie Street, Lochee; (3) the reconditioning and increase of capacity of one gasholder at the works, East Dock Street, to the extent of 350,000 c.ft. By this means the total available storage would be increased to round about 6,800,000 c.ft., with the expenditure spread over (say) the next five years. Through the operation of the sinking fund, the yearly contribution to which now approximates £32,000, these extensions and the modernizing of manufacturing plant can be effected without increasing the outstanding loan debt or having any detrimental effects upon the price of gas.

Gas Light and Coke Company's Dividend.—The accounts of the Gas Light and Coke Company for the past year show that, subject to audit, the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4 p.ct. consolidated preference stock, at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock, at the rate of 3½ p.ct. per annum; and on the ordinary stock, at the rate of £5 1s. 4d. p.ct. per annum, carrying forward to the next account the sum of £121,577 1s. 1d.

STOCK MARKET REPORT.

APART from the continued strength of gilt-edged securities, influenced doubtless by the excellent results of the new Treasury Bond issue and the success of the India loan, business in most sections of the Stock Exchange was decidedly slack last week. Towards the close, however, fresh buying for the new account improved matters, and there were some bright features. In the Industrial Market, Triplex Glass jumped up again, and Associated Cements were in demand on the good results of the past year. The easy monetary conditions brought about an active demand for British Government stocks, and the influence extended to India and Colonial issues. Most of the principal stocks advanced in price. The Funding Loan, both the Conversions Loans, and the 5 p.ct. War Loan, all showed improvements varying from ⅛ to ¼.

In the Gas Market, though transactions were not perhaps so numerous as usual, there was a substantial amount of business done. The most prominent feature of the week was the rise of 10 points in the South Shields consolidated at the Newcastle Exchange; and at the last rate of dividend (8½ p.ct.), the present quotation, 111-113, is quite justified. South Suburban ordinary moved up again, and now stands at 105-108. This would be a high price, having regard to the limitation of the dividend for the past half-year, were it not for the fact that the dividend is payable in about a month's time. The Company's application to Parliament for a basic price and dividend on the South Metropolitan system is possibly creating an interest in the stock.

Two dividend announcements were made last week. The Commercial Company recommend a final dividend at the rate of 7 p.ct. per annum for the half-year to December, making 6 p.ct. for the year. This rate compares with £5 6s. 8d. p.ct. and £5 3s. 4d. p.ct. on the old 4 p.ct. and 3½ p.ct. stocks now merged under the Company's Act of 1927 and described as ordinary stock. The higher distribution fully justifies the improvement that has taken place during the past year in the value of the stock. The Gas Light and Coke Company recommend a dividend at the rate of £5 1s. 4d. p.ct. per annum for the half-year, making £5 0s. 8d. for the year.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 95, Commercial 3 p.ct. debenture 58, Gas Light and Coke 92⅝, 92¾, 93, 93¼, 93½, 93⅝, 3½ p.ct. maximum 63½, 64, 4 p.ct. preference 79, 3 p.ct. debenture 59½, 60, Imperial Continental 145½, 146½, Primitiva 20s. 7½d., 20s. 9d., 20s. 10½d., 21s., 21s. 1½d., 4 p.ct. debenture (1911) 76, 76¼, San Paulo 5 p.ct. debentures 47, South Metropolitan 104¼. Supplementary prices, Croydon 5 p.ct. debenture 95⅞, Southend and District new ord. 85, new ord. "B" 83½.

On Tuesday, Alliance and Dublin 95¼, 96, 97⅛, Gas Light and Coke 92⅞, 93, 93¼, 93⅜, 93⅝, 93¾, 3½ p.ct. maximum 64, 3 p.ct. debenture 59¾, 60½, Imperial Continental 146, 147, Primitiva 20s. 10½d., 21s. 1½d., San Paulo 5 p.ct. debentures 47½, South Metropolitan 103½, 103⅞, 104¼, 6 p.ct. preference 112, South Suburban 5 p.ct. 104, Tottenham "B" 91½, Wandsworth new 97, 98. Supplementary prices, Southend-on-Sea new 86, new "B" 84½.

On Wednesday, Gas Light and Coke 93, 93⅛, 93⅜, 3½ p.ct. 64, 64¼, 4 p.ct. preference 78, Imperial Continental 146⅜, 147, Primitiva 20s. 7½d., 20s. 9d., 20s. 10½d., 21s., 21s. 1½d., South Metropolitan 103½. Supplementary prices, Bournemouth 7 p.ct. debenture 102½, Bristol 4 p.ct. new debenture 74, Folkestone 76½, Liverpool 5 p.ct. 88¼, 89.

On Thursday, Aldershot 71½, Bombay 22s., 22s. 3d., European 7⅛⅛, Gas Light and Coke 93, 93⅜, 4 p.ct. preference 78, 3 p.ct. debenture 60½, Imperial Continental 146, 146½, Liverpool 7 p.ct. preference 103½, Primitiva 20s. 6d., 20s. 9d., 20s. 10½d., 21s., South Metropolitan 3 p.ct. debenture 60½, South Suburban 5 p.ct. 105, 105⅛, 105¾. Supplementary prices, Ascot 6 p.ct preference 10⅜, Bournemouth 7 p.ct. debenture 103.

On Friday, Alliance and Dublin 96½, Croydon sliding-scale 100½, maximum dividend 84, Gas Light and Coke 93, 93⅛, 93⅛, 93⅜, 93½, 93⅞, 94, 94⅛, 3½ p.ct. maximum 64¼, 3 p.ct. debenture 60½, 60¾, Imperial Continental 147, 147¼, Oriental 110½, 111, Primitiva 20s. 6d., 20s. 9d., 20s. 10½d., South Metropolitan 103, 104, South Suburban 5 p.ct. 107, 107¾.

The possibility of a reduction in the Bank Rate was freely and optimistically discussed in the City. The influx of gold has become increasingly felt, and a 4½ p.ct. rate is becoming ineffective. The result of the Treasury Bill allotment (applications for which exceeded 72 millions) caused discount rates to droop. The average rate for these bills was only £3 19s. 4·36d. p.ct.—5s. p.ct. less than the previous week's rate. Old day-to-day loans were continued at 3½ p.ct., and fresh accommodation was obtainable at from 3½ p.ct. down to 3 p.ct.

On the Foreign Exchange Market, the Dollar-Sterling was weaker, the final quotation being 4.87⅜. French francs were firm at 124; Dutch florins moved against sterling to 12.68¼; pesetas were slightly cheaper at 28.47; and Italian lire at 92.15 were virtually unaltered.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2¼ p.ct. at call and 2⅝ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr	NAME.	Quotations. Jan. 30.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			% p.a	% p.a.				
171,978	Stk.	Sept 8	5	5	Aldershot 5 p.c. max. C.	68—78	..	71½
223,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,561,868	,,	Sept. 29	7	7	Alliance & Dublin Ord.	94—98	+1	95—97⅜
274,000	,,	Jan. 12	4	4	Do. 4 p.c. Deb.	64—67*	..	..
533,654	,,	Aug. 25	—	7	Barnet Ord. 7 p.c.	105—108	..	..
300,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/6—23/6	..	22/— 22/3
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
600,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
375,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅝—11½	..	..
50,000	Stk.	Jan. 12	3	3	Do. 3 p.c. Deb.	55—58*	..	..
169,026	,,	,,	4	4	Do. 4 p.c. Deb.	74—77*	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	108—111	..	..
341,800	,,	,,	—	6/8/6⅔	Do. 5 p.c. Con.	98—101	..	..
1,387,600	,,	July 28	5	5	Bristol 5 p.c. max.	87½—88¼a	..	..
865,000	,,	Sept 29	7	8	British Ord.	111—114	+1	..
100,000	,,	Dec. 22	7	7	Do. 7 p.c. Pref.	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—75	..	..
200,000	,,	,,	—	38/2	Do. 5 p.c. Red. Deb.	93—96	..	..
100,000	10	Nov. 24	8	6	Cape Town, Ltd.	7—8	..	..
100,000	10	Oct 27	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 22	4½	4½	Do. 4½ p.c. Deb.	72—77	..	..
626,860	,,	July 28	6	6	Cardiff Con. Ord.	100—103	..	..
237,860	,,	Jan. 12	7½	7½	Do. 7½ p.c. Red. Deb.	101—104*	..	..
157,150	,,	Aug. 11	6½	5	Chester 5 p.c. Ord.	87—92b	..	..
79,185	1	Oct. 13	1/9	1/9	Colombo Ltd. Ord.	31/—33/-	..	..
94,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
321,490	1	Oct. 13	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/—26/-	..	..
178,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
2,073,280	Stk.	July 14	—	5	Commercial Ord.	93—95	..	..
475,000	,,	Dec. 22	3	3	Do 3 p.c. Deb.	55—58	..	58
350,000	,,	Sept. 29	‡1	‡1	Continental Union, Ltd.	28—33	..	..
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	90—95	+3	..
787,560	,,	Aug. 11	6¼	6¼	Croydon sliding scale	98—101	..	100½
408,100	,,	,,	5	5	Do. max. div.	81—84	..	84
492,270	,,	Aug 25	9	6	Derby Con.	103—105e	..	..
55,000	,,	Dec. 22	4	4	Do. Deb.	71—78c	..	..
209,000	,,	Aug 25	5	5	East Hull Ord. 5 p.c.	78—81	..	..
50,000	,,	Dec. 22	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,002,180	10	8-pt. 29	‡3	‡4	European, Ltd.	7⅞—8	..	..
5,747,460	Stk.	July 28	5	5	Gas Light & Coke 4 p.c. Ord.	93—95	..	93⅜—94⅛
2,000,000	,,	,,	8½	8½	Do. 8½ p.c. max.	62½—64½	..	63⅛—64⅝
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—79	..	75—79
5,502,830	,,	Dec. 22	3	3	Do. 3 p.c. Con. Deb.	59—61	..	59½—60⅝
181,315	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	101—104	..	..
1,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98—100	..	..
40,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 25	6½	6½	Hastings & St L. 5 p.c. Conv	89—92	..	..
258,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	70—73	..	..
70,000	10	Oct. 18	‡10	‡10	Hongkong & China, Ltd.	12—13	..	..
173,200	Stk.	Aug. 25	5	5	Hornsey Con. 3½ p.c.	75—78	..	..
1,976,000	,,	Nov. 10	10	10	Imperial Continental Cap.	145—148	+1	146⅝—147½
233,186	,,	Aug. 11	3½	3½	Do. 5½ p.c. Red. Deb.	68—70	..	..
235,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	96—99	..	..
2,146,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	88—90b	+½	..
600,000	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
185,785	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap.	107—112	..	..
75,000	5	Dec. 22	‡7	‡8	Malta & Mediterranean	5½—5⅝	..	..
541,920	Stk.	Nov. 24	‡7	‡6	Montevideo, Ltd.	91—93	..	..
2,051,815	,,	July 28	5	5	Newcastle & Gateshead Con.	79½—80½d	+½	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	67½—68½d	..	..
691,705	,,	June 29	8½	8½	Do. 3½ p.c. Deb.	65½—66½d	−1	..
181,785	,,	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con.	93—96	..	..
900,000	,,	Nov. 24	7	9	Oriental, Ltd.	108—113	..	110½—111
188,120	,,	Dec. 22	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
236,782	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,389,909	1	—	—	—	Primitiva Ord.	20/3—21/3	−/3	20/6—21/1½
282,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	90—93	..	..
600,000	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	75—77	..	76—76½
434,958	,,	Dec. 22	4	4	Do. 4 p.c. Cons. Deb.	74—76	..	..
150,000	10	Sept. 29	6	6	San Paulo 5 p.c. Pref.	84—85½	..	..
125,000	50	Jan. 8	5	5	Do. 5 p.c. Red. Deb	46—48	..	..
270,000	Stk.	Sept. 8	5½	5½	Sheffield A	102—104e	..	47—47½
419,968	,,	,,	5½	5½	Do. B	102—104e	..	..
1,047,000	,,	,,	5½	5½	Do. C	102—104e	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,809,895	Stk.	Aug. 11	7	5	South Met. Ord.	103—105	..	103—104½
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	112
1,595,445	,,	Jan. 12	3	3	Do. 3 p.c. Deb.	59—62*	..	60½
784,000	,,	Sept 8	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	..
91,500	,,	Aug. 11	8½	8½	South Shields Con.	111—113d	+10	..
1,343,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	105—108	+3	104—107½
868,827	,,	Dec. 22	5	5	Do. 5 p.c. Deb.	93—96	+1	..
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max	78—81	..	..
131,375	,,	Dec. 22	4	4	Do. 4 p.c. Deb.	72—75	..	..
350,000	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref.	103—106	..	..
200,000	,,	Dec. 22	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
150,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	107—110	..	..
662,275	,,	,,	6½	6½	Do. ⅓ 3½ p.c.	91—94	..	..
130,000	,,	,,	6½	6½	Do. 5½ p.c. Pref.	97—100	..	91½
181,355	,,	Dec. 8	4	4	Do. 4 p.c. Deb.	74—77	..	..
268,251	,,	Sept. 29	5	5	Tynemouth Con. and New	81—83d	..	..
259,094	,,	Aug. 25	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	88—92	..	..
80,000	,,	July 14	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	127—132	..	..
355,636	,,	,,	7	7	Do. B 5½ p.c.	107—112	..	..
432,535	,,	,,	5/19/0	5/19/0	Do. C and New	94—99	..	..
382,000	,,	,,	6½	6½	Do. Wimbledon 5 p.c.	102—107	..	97—98
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	110—115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	87—92	..	..
88,416	,,	Dec. 22	3	3	Do. 3 p.c. Deb.	55—59	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	73—76	..	..

Quotations are:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

TRADE NOTES.

"W-D" Verticals at Inverness.

The Inverness Corporation Gas Department, on the recommendation of their Engineer and Manager, Mr. Andrew Thomson, have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for an extension to the existing installation of vertical retorts. This will consist of one setting of four 62-in. retorts complete with recuperators and producer, together with electrically-driven lift, coke screens, and 55-ton storage hoppers. The contract also includes a waste-heat boiler designed to serve the new and the existing settings. The new setting will be capable of carbonizing 28 tons of best-quality screened Scotch coal per 24 hours.

Synthetic Ammonia by the Fauser Process.

We are informed that Messrs. Evence Coppee & Co., of 103, Boulevard de Waterloo, Brussels, are installing at their bye-product coke oven works at Willebroeck a large plant for the manufacture of synthetic ammonia by the Fauser process. This plant is intended to deal with the gas from the coke ovens already in operation at Willebroeck. The programme is to produce annually a total quantity of 100,000 tons of sulphate of ammonia. This production would be obtained in three successive stages of about equal importance, the first of which is at present under construction. Messrs. Evence Coppee & Co. decided upon the Fauser process after having given the various processes due consideration. The first unit is expected to be in operation about the end of this year. About 100,000 tons of sulphate are being manufactured annually in Italy by the Fauser process.

Messrs. Cochrane & Co., Ltd.

The Derwent Valley Water Board have awarded to the South Durham Steel and Iron Company, Ltd., West Hartlepool, through their Pipe Selling Agents, Messrs. Cochrane & Co., Ltd., Middlesbrough, a contract for the supply of over 7000 tons of 47-in. diameter mild-steel pipes. These pipes will be manufactured from material of entirely British manufacture. They will be fabricated at the new steel pipe works of the South Durham Steel and Iron Company, Ltd., Stockton-on-Tees, which is probably the most modern plant of its kind in the world, and since being installed has executed practically all the important large steel pipe contracts in this country and abroad. The outstanding feature of this contract is that the pipes will be protected against the ravages of corrosion by means of a bituminous lining applied centrifugally under the Talbot patent lining processes, which are now being largely utilized by waterworks engineers in Great Britain and U.S.A., for the protection of their steel and cast-iron mains. The works are engaged at present in executing orders for steel pipes, which they have taken against severe Continental competition, for the waterworks of Buenos Aires and the Rand Water Board's new scheme at Johannesburg. The South Durham Steel and Iron Company are also effectively carrying on the slogan "Use British Steel," by undertaking work, hitherto carried out largely by Continental firms, for hydro-electric schemes, and are presently executing orders for the North Wales Power Company for the Maentwrog hydro-electric scheme, and the extensive hydro-electric pipe system of the British Aluminium Company at their new works at Lochaber.

Good Working at Malvern.

In moving the adoption of the report of the Lighting Committee at a recent meeting of the Malvern Urban District Council, Mr. W. Evans, Chairman of the Committee, said he wished to call the attention of the Council to the enormous increase in the make of gas, not only during the past twelve months, but throughout the period since they had a new Gas Manager and Engineer—Mr. E. D. Wooten. He had figures drawn up by the Department, showing the amount of gas made during the Christmas week that had just passed compared with the Christmas week of the previous year. The increase over the previous year was somewhere about 26·5 p.ct.; but compared with the Christmas week of 1921—six years ago—it was an increase of 62·3 p.ct. When it was remembered that they had not sufficient holder capacity, he thought those figures certainly stated a case for a new holder. They should at the earliest possible opportunity secure another holder. From the time that the order was given, practically twelve months would expire before they would have the holder in operation. The Committee reported that during the six months ended September, 1927 (since the new retort plant had been working), there had been a saving of 848 tons of coal used for the manufacture of gas, compared with the corresponding period of the previous year.

Sutton Gas Company's Reduction.—Consumers of the Sutton Gas Company have been notified of a reduction in the price of gas by three-fifths of a penny per therm (3d. per 1000 c.ft.), as from the reading of the meters for the December quarter. The price will now be 9d. per therm in Sutton and Cheam and 9¼d. per therm in the outer areas of the Company's district.

Cheap Industrial Gas.—Speaking at a meeting of the Midland Section of the Coke Oven Managers' Association at Sheffield, the Chairman (Mr. C. P. Finn) pointed out that coke-oven industries in certain areas were in a position to supply cheap gas to industries, but there were obstacles in the way by reason of statutory powers given to gas companies. Mr. Finn mentioned that the Gas Acts were under revision, and he hoped that legislation would be passed to deal with the situation. Gas companies' prices for industrial users were, he said, practically out of court. Coke oven gas that might be sold cheaply to industry was, in some cases, being wasted. He would much prefer to sell it, even if he could get only 6d. per 1000 c.ft. If legislation could come along to make it easier for coke oven people to negotiate with industrial concerns, it might make all the difference whether coke ovens paid or lost. It was up to coke oven managers to lose no opportunity to get into touch with firms the moment the embargo was lifted, and to supply the gas.

World's Largest High-Pressure Industrial Steam Plant.

An interesting steam-raising plant is being constructed for Synthetic Ammonia and Nitrates, Ltd., at Stockton-on-Tees. This extension to the firm's plant will be the largest high-pressure plant in the world as an industrial unit, and it will be designed and constructed throughout by International Combustion, Ltd., on the "Lopulco" system. Every detail of the plant will be manufactured in this country. The pressure to be employed in the installation is 800 lbs. per sq. in., which, with the exception of the Milwaukee (U.S.A.) undertaking, where one boiler operates at 1300 lbs. pressure, is the highest yet employed. The plant at which previously the highest pressure was employed in this country is that of the Leeds Corporation's new electricity extension; the boilers working there at 450 lbs. This contract also was placed in the hands of International Combustion, Ltd. In the new plant for Synthetic Ammonia and Nitrates, Ltd., each of the six boilers will be of special construction and of a capacity of 269,000 lbs. maximum evaporation; the final temperature being at the high figure of 840° Fahr. The design of the pulverized fuel plant will be on the bin and feeder principle; every wall of the combustion chamber being entirely water-cooled. The new type of "R" burner recently evolved by International Combustion, Ltd., will be embodied, the advantages of this being that it will effect a considerable reduction in the size of the combustion chamber, and, secondly, that it will obviate any possible segregation of the fuel. The Raymond mills, which will be installed for grinding coal are to be designed on the closed system. No dryers are to be employed; the drying of the coal being effected in the mill circuit. The plant for handling coal will have a capacity of 3800 tons per day. For ash sluicing, the "Usco" system will be used. The volume of steam to be dealt with from this plant every 24 hours will amount to 11,700 tons; this being passed through high-pressure turbines for the production of electricity.

Reduction in Price at Torquay.—The Torquay and Paignton Gas Company announce a reduction in price, as from the meter readings for the Christmas quarter, of a halfpenny per therm, equivalent to 2·4d. per 1000 c.ft.

Derbyshire Gas Tests.—Mr. John White, the Derbyshire County Analyst, reports that during the past quarter tests have been made at 21 gas undertakings, and the results show that all the concerns have fulfilled their obligations under the Gas Regulation Act.

Course of Lectures for Smoke Inspectors.—The Royal Sanitary Institute have arranged a course of lectures and demonstrations on lines similar to those of last year, the programme for which was published in the "JOURNAL" for Oct. 26, 1927. As before, the fee for the course is £1 10s.

Primitiva Gas Company.—At the adjourned meeting of the 4 p.ct. first debenture holders of the Primitiva Gas Company of Buenos Aires, on Jan. 18 (which was rendered necessary by the fact that sufficient votes were not available at a meeting the previous week—see "JOURNAL" for Jan. 18, p. 156), a number of large holders attended personally. The resolution submitted was passed by the requisite majority.

Competition in Industrial Designs.—Particulars of the Fifth Annual Competition of Industrial Designs to be held at the Imperial Institute, South Kensington, S.W., in June, have now been issued, and can be obtained from the Secretary of the Royal Society of Arts, John Street, Adelphi, W.C. 2. Intending competitors must apply to the Secretary of the Society between May 1 and May 12 for the necessary entry forms. In all, scholarships and prizes amounting to £1600 are offered in connection with the 1928 Competition.

Storage Capacity at Helston.—The Helston Corporation Gas Manager (Mr. W. McLean) reported to the last meeting of the Town Council that it was necessary something should be done promptly with regard to the erection of a new holder. They were working the plant at full pressure each week-end to meet the demand; and if anything went wrong with the production of gas, there would be only a few hours' reserve. It was stated that the gas-works were purchased from the local Company two years ago, and the Council had found the storage inadequate; while the question of providing a new holder became acute a few months ago, when a slight mishap left the town in darkness. Sanction had been obtained from the Ministry of Health to borrow £3500 for a holder; but their difficulty was to find a safe foundation. The Surveyor was asked to prepare definite estimates of the cost of doing this on alternative sites.

Messrs. Spencer-Bonecourt, Ltd., have changed their address to Broadway Buildings, Broadway, London, S.W. 1. Telephone No: Victoria 2802-3.

The Audley Urban District Council have had before them the question of the serious condition of their retort house, and have decided that the full Council shall meet at the gas-works to consider what to do in the matter.

A party of about sixty sat down to the annual dinner given to their employees by the Directors of the Chertsey Gas Consumers' Company, which (in the unavoidable absence of the Chairman) was presided over by Mr. F. Bartholomew. The toast of "The Visitors" was responded to by Mr. W. H. Ely (Manager of the Woking District Gas Company), who paid a tribute to the excellent management of the Chertsey Company. The Chairman, in proposing "The Staff and Men," remarked that the relations between the Directors and employees had always been of a very cordial nature. The toast was acknowledged by Mr. H. J. Hamilton (Secretary), and Mr. F. G. Matthews (Manager), and Mr. C. Smith on behalf of the men. Mr. Matthews said that in his 34 years' experience of the gas industry he had never seen a better spirit among men than existed in Chertsey at the present time.